The Builder.

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The Two Art Palaces at the Paris Exhibition.

THE Art Show at the Paris Exhibition is at last complete, and one can form a definite idea as to the inside of the Grand Palais and its contents; at the time of the professed "opening" of the Exhibition it was empty and still in the hands of workmen, and it says much for the energy of all concerned that such an immense assemblage of works of art should have been arranged and hung, and the rooms and galleries decorated, within the space of a few weeks; people who had not seen the state of the building in the opening week would hardly credit what has been done since then.

The exterior design of the building we have before described and illustrated. Everything in connexion with this portion of the Exhibition is on so large a scale that it is only after endeavouring to see, cursorily at all events, every part of its contents, that one realises what an immense building this is; and considering it as the home of the future Salons one looks with some dismay at its two stories of galleries surrounding the central court, for this immense space for hanging pictures may be by no means the best thing for the quality of the future exhibitions; if all this wall space is to be filled the standard cannot be kept as high as it ought to be.

However, that is in the future. The Grand Palais, though it is one great building externally, may be considered, internally and on plan, to consist really of two buildings joined together. The main and larger portion is in the plan of an inverted ⊥, with a very short shank, the long base of the plan being parallel with the line of the new Alexandre III. bridge, and with the front of the Petit Palais opposite. To the end of the shank is joined on, as a crosspiece, the block containing the smaller suite of galleries appropriated at present to the Exposition Centenniale, consisting of examples of French art from the commencement of the present century; this block is slightly oblique to the main block, as its front follows the line of the Avenue d'Antin, which converges slightly towards that of the axis of the new bridge. The two blocks have been very successfully treated so as to assume the appearance of one great building externally, although internally they are kept quite distinct. In the main block the central court for sculpture follows the line of the inverted ⊥, the galleries being built round it in the same form. The lower galleries are side-lighted; the upper range, which are the loftier and more important, are top-lighted; and in addition to them there is a narrow open balcony running round the courtyard, like the old one in the Palais de l'Industrie, and which, as was the case in that building, is utilised for the exhibition of architectural drawings and works in black and white. At the upper end of the shank of the plan is the principal staircase from the courtyard to the upper galleries—a finely-designed one, rising in a broad flight from each side of the area, each side dividing near the top into two flights, branching in opposite directions; the whole decorated with a gilded railing of fine and flowing design, much less "classical" and more essentially modern in feeling than anything on the exterior of the building.

The whole of the courtyard area is under a great glass roof, a feature quite unavoidable if the sculpture is to be properly lighted, but which, it must be admitted, spoils the architectural effect from the exterior, where we see a very solid piece of masonic architecture, of the most classic type, surmounted by this mass of glass roof. The central domical portion of the roof is carried by four pairs of curved principals, each pair starting, at some few feet distance, from the angles of the centre space, and meeting at the centre, being intersected and tied by two circular horizontal girders, one about half-way from the springing, the other near the apex. The roofs of the transept portions are stopped on each face by a girder semicircular in section, starting from the inner side of each pair of main girders, but having a twist backwards on plan, accompanied by a torsion in the plane of the upper and lower members, which has a curious and rather unsatisfactory effect to the eye, and must have required very careful fitting and setting out of the cross-bracing.

The central sculpture court is not nearly as large in area as that of the Galerie des Machines, which however served for the sculpture both of the Old and New Salons; whether it is as large as that of the Palais de l'Industrie, which the Old Salon had all to itself, it is difficult to judge, as we have no plan of the demolished building at hand to refer to; but judging from recollection the Palais de l'Industrie court was larger. The sculpture in the new court certainly looks very much crowded, but this is partly from the nature of the exhibits; a number of sculptors, French and foreign, having apparently seized the occasion to produce colossal monumental works—equestrian statues of gigantic size, and other monuments with groups of figures, so that both from the ground level and from above the works seem inconveniently crowded. On another occasion we may notice the sculpture in detail; but for the present we confine ourselves to a more general description of the building and its contents.

The northern half of the space is allotted to French art, the southern half to the art of foreign countries. No one ought to complain of this allotment of space; the French have got up the show, it is their Exhibition, and they are quite justified in devoting a larger space to their own art than to that of foreign exhibitors. The French section of painting does not seem, as far as our recollection goes, to be equal to that of the 1889 Exhibition. In the preface to the catalogue it is stated that the jury of class 7 (painting) kept specially before them the idea that this being a State exhibition, they were bound as far as possible to endeavour to represent French art of the last ten years (that is the limit of time) as a whole, and not to take count of individual groups of

artists who might suppose themselves to have special claims; and this programme seems to have been conscientiously carried out in intention; but there dwell in one's recollection a good many works in the Salons of the last ten years, which one would have expected to find here, and which are wanting; and on the other hand there are undoubtedly a good many bad pictures hung. Among the best things in the collection, we find M. Aublet and M. Bouguereau well represented; M. Benjamin-Constant also, among whose works is a portrait of the Queen, a splendid piece of effect in colour and lighting, and an immense canvas representing Urban II. entering Toulouse to preach the first Crusade, which is all suffused with a red tone that does not explain itself. M. Béraud's picture of Christ and the Magdalen translated in modern life is there; a considerable collection of the works of M. Jules Breton; several of M. Carrière's misty pictures, and quite a collection of M. Cazin's beautiful landscapes, &c. We can only name a few prominent works of high order—M. Chartran's "St. Francis d'Assisi au Labor"; M. Collet's "Repas d'Adieu," M. Dagnan-Bouveret's "Last Supper" and "Bretonnes au Pardon"; Mdme. Demont-Breton's "Dans l'Eau bleue"; M. Detaille's "Sortie de garrison de Huningue"; M. Friant's "Douleur"; M. Gervais' "Jugement de Paris"; M. Harpignies' "La Loire"; M. Henner's beautiful and well-known "Eclogue"; M. Lhermitte's "Les Faucheurs"; M. Henri Martin's "Chacun Sa Chimère"; and M. Tattegrain's horrible but probably only too true picture of a circumstance of mediæval war, "Les Bouches Inutiles." MM. Raphael Collin, J. P. Laurens, Jules Lefebvre, and Roll are also well represented.

One can hardly say that the English school of painting is as strongly represented as it might have been. Millais' portrait of Mr. Hare and "The Old Garden," both admirable pictures, can neither of them be counted among his great works. Leighton is represented by the "Return of Persephone" (as well as some lesser works); Mr. Watts only by a landscape. Henry Moore is represented by one of the finest of his seas, and Mr. Dicksee by the best picture he has ever painted, "The Confession." Mr. Mark Fisher is not represented at all, and Mr. Sidney Cooper is. "Launcelot's Dream" is certainly not Burne-Jones at his best, but it is the best representation of him here. There are various good works of well-known names, also some bearing names very little known to fame. On the whole, one feels that England might have made a stronger appearance; but whose fault it is that she did not we cannot undertake to say.

In spite of this, however, we cannot but feel, in going through the painting galleries, that in this art it is France and England first and the rest nowhere. The paintings in most of the other galleries seem to consist of either mediocrities or eccentricities. One or two of the pictures which make the most mark among the foreigners are, rather unexpectedly, from Italy; for instance, Signor Grosso's portrait of a lady in bronze-green velvet with a great gilt carved bird rising up behind her, and Signora Dall' Oca's "Les Amours des Ames," a scene of groups praying over the graves in a cemetery, a work marked both by pathos and a distinct style and treatment of its own. The Japanese Gallery shows of course the special qualities of Japanese art, its merits and limitations, of which one is reminded by the large drawing of a tiger with his back to the spectator and head turned sideways; the head is shown with great power, but the foreshortening of the body is all wrong, and it looks twice too long. The Americans have got together a gallery of painting, but it cannot be said to contain anything of more than mediocre interest. Outside their gallery, on the balcony, is Mr. Saint-Gaudens' alto-relief "Shaw Monument," a mounted officer riding along, with a background of marching troops; but though this has the merit of vigour and sincerity, it illustrates the fact that American sculptors have not yet realised the quality called *style*. A Croatian artist surprises us by a rather powerful picture of "The Death of Abel," painted (whether intentionally or not) somewhat in the manner of M. Henri Martin. The Germans are conspicuous here, as elsewhere in the exhibition, for the effective manner in which they have got up and decorated their gallery. It is entered through semi-circular columned exedræ, the columns being treated with a surface as if covered with mosaic (which at least gives texture); between the large galleries are connecting vestibules with columns in scagliola; the walls of the galleries have a black marbled dado, a surface above in which gold predominates, and a frieze of symbolical animals in light grey on a black ground. The carpet or drugget selected for the floors, a mottled stuff in low tones, is also very effective.

In the balcony running round the central space of the building the French show an immense collection of architectural drawings, which (we need hardly say) are of the first order, but they are mostly the selection of the exhibits of eminent architects and Prix-de-Rome men for ten years back, and all the principal and largest sets have been previously mentioned and described in our columns. The more modest architectural exhibits of the Americans and English occupy positions very near to each other, on the walls near one angle of the balcony, but not visible together; one has to turn the corner. The Americans have confined themselves to photographs of executed works, which have the advantage of going into a smaller space than architectural drawings usually do; they have made a very representative collection, and one which shows a very high average both of originality and of dignified style in the treatment of buildings. The English exhibition is almost entirely one of drawings, which in a sense are no doubt more interesting than photographs; the collection, though not numerous, is a very fairly representative one; we know that every pains was taken to render it so. Among the principal works illustrated are Mr. Aston Webb's design for the proposed Royal Naval College at Portsmouth, and Messrs. Webb & Bells' Christ's Hospital; Professor Aitchison's Arab Hall; Mr. Belcher's Colchester Town Hall; Mr. Caröe's Archbishop's Palace at Canterbury; Mr. Ince's Courtyard of Mr. A. Gilbert's Atelier; Messrs. Lanchester, Stewart, & Rickards' Cardiff Town Hall; Mr. Jackson's Entrance to the Geological Museum at Cambridge; Mr. May's Jardine Hall; Mr. Mountford's Northampton Institute; a House by Mr. Ernest Newton; three Street Façades by Mr. Beresford Pite, &c. We could have wished to have seen illustrations of the new Government and War Offices, and also of Mr. Belcher's Chartered Accountants building—one of the most original recent works in English architecture.

After looking through all the immense galleries of the front block of building in the Grand Palais, there is an architectural surprise in store for the visitor, when on going through the portal communicating with the Centennial Exhibition, we find ourselves in the gallery of a large domed central hall of monumental character and of great originality and beauty of design. The main supports of the dome are massive square piers, decorated with panels in which gold ornament is inserted over a ground of dark marble. These piers run through both stories, with intermediate columns on each story. Over each pier are sculpture subjects at the base of the dome, between which the surface is modelled into rather *rococo* ornament. As we have before said, the French are at present rather inclined to overdo the modelling of surfaces, and leave the eye no rest; this is the case here; and again, the carved foliage brackets (if one can call them so) beneath the gallery front, on each side of the piers, are far too ragged and deficient in structural line for such a position, for they occupy the place of brackets and ought to have been designed in character with such a function. The mosaic floor under the dome is a fine piece of work in a sufficiently severe foliage design and in delicately harmonised colours; and the great wrought-iron gates which give access to this hall from the Avenue d'Artin are worth attention. To right and left long galleries extend on either side of the circular hall; those on the first floor, each of which ends in a special decorative architectural treatment, are so designed that there is an uninterrupted vista from end to end of the building, across the circular hall. As a matter of architectural detail, too, it should be observed how all the lines of steps are modelled in this building; they are none of them either straight lines or even parts of circles on plan, but always with a freehand modelling of the line of steps, which seems to make them a part of the expression of the architecture.

We can only briefly indicate the nature of the contents of the Centennial Exhibition. In the preface to the catalogue it is stated that the Committee for this Exhibition considered it part of their programme that nothing should be admitted which had been seen in the last retrospective Exhibition in 1889. This was perhaps a right decision, but they admit that they have been somewhat hampered by it, and it is probably owing to this that one's first impression was that the 1889 retrospective Exhibition, speaking from memory, was more interesting than this one, at all events in the matter of the pictures. Still there is a great deal that is well worth seeing. In the side galleries which surround and partly open out of the central area the principal paintings have been arranged—the earlier ones of the century downstairs, the later ones above. In the downstairs galleries is a considerable collection of works by Delacroix, some of them old-fashioned in a sense, from the point of view of the present day, but others which can never be called so; look

for instance at the beautiful composition and colour of the little "Apollo and Daphne," also at the "Femmes d'Alger," an interior in which Delacroix seems to have anticipated Gerôme. Ingres is another of the older painters illustrated; some of his portraits are very fine, and also his small and carefully finished picture of "Ruggiero Rescuing Angelica." A small picture by Bouchard of "The Death of Cæsar" is remarkable for the dramatic fury of the action in it. In the upper corresponding galleries are many fine works by later men of the century, deceased or living; we may mention among them various works by M. Jules Breton; some early Meissoniers of great delicacy and beauty; two large pictures by Falguière, the late sculptor, a Magdalen and Cain and Abel; M. Fantin-Latour's portrait group, "Coin du Table;" "L'Etoile," a most beautiful and poetical nude by Chaplin, and various works by Dupré, Baudry, Chasseriau, Corot, Daubigny, David, Delaunay, Gericault, Prud'hon, Robert Fleury, Rousseau, Troyon, and other names of vanished worthies of French art.

The centre galleries upstairs—the vista galleries, contain a large and most interesting collection of sketches and studies by various artists; sketches by Chapu, Legros, and Delaunay; portrait studies by Cabanel; studies of rustic figures by Millet and Jules Breton; and a large number by Gericault and Prud'hon; those of Gericault being among the most vigorous and energetic of the collection. On the floor of the circular hall and in the ground-floor galleries on each side of it is a large collection of the works of deceased sculptors as well as of some living ones; the older works show how much progress has been made in modern France in the detail of modelling, and in vigour and individuality of style; yet some of these older works have a special beauty of their own, in their calm and restrained style; a useful reminder to the French school of sculptors of the present moment, who seem terribly prone to spoil their art by sensational subjects, and want of repose (naturally) in their treatment. In two of the ground floor rooms is a collection of architectural drawings; among others Percier and Fontaine's design for the State tribune for the distribution of Eagles by the Emperor in 1805, showing the magnificent scale on which things of this kind were done under Napoléon's rule. Finally, it should be mentioned that another downstairs gallery in the Centennial Exhibition contains a very fine collection of furniture mainly of the First Consul and Imperial period, though with some reminiscences of the Louis Seize style here and there. There is a catalogue of these, but none of the objects are numbered, or were at the time of our visit; they hardly require description or identification, however, unless as a mere matter of historical interest.

The interior of the Petit Palais, now open to the public, is another architectural surprise. The outside flight of steps leads us through a finely-designed pair of gilded folding gates into a large central vestibule roofed by the dome, the ceiling of which, like that of the larger palace, is covered with modelled ornament a little too deficient in restraint and severity. To right and left, raised seven steps above the floor of the vestibule, stretch two great halls with waggon roofs, each ending in a large apse or tribune. These halls are at present only occupied by some examples of armour ranged along the sides, and have so fine an effect with their spacious unencumbered floors that we may well wish they might be left as they are. The pilasters in the halls and vestibule are of a light-toned pink marble which has a very bright effect. In the design of the steps up to the entrance, and those from the vestibule to the two halls, a curious little point has been made; the white stone steps are curved on plan, but in the centre portion of each of them is a wide strip of marble, not radiating with the steps, but straight down their centre line, with a narrow strip of the same at each side, the whole looking like a kind of reminiscence, in permanent material, of a state carpeting down the centre of the steps. It is perhaps a little too playful an incident, however, in a permanent and monumental building.

Behind this longitudinal front block of building the remainder of the palace takes the form of an annexe of which the inner line is semicircular, leaving a semicircular garden in the centre with a colonnaded loggia round it. Outside of the loggia are two ranges of galleries, the inner one following the semicircular line, the outer one arranged as a semi-hexagon, its sides tangent to the circle. The view of this portion of the building from the garden is charming; we have first the colonnade with its marble columns divided into bays by piers at intervals, and with a very effective stone cresting above the cornice, partly heightened by gilding; and above and behind that, at a higher level, the circular balustrade of the inner main gallery, adorned above each pier with a large and beautifully-designed decorative vase. Seen under the strong sunlight and bright blue sky of Monday last, the architecture of the court, with its resplendent white stone, coloured marble columns, and gilding on the salient points, presented a most beautiful appearance; it is a festal architecture, no doubt, and looks its best in fine weather, but it is a really original architectural conception. From the further side of the loggia we look back at the inner side of the centre pavilion, with the dome and its gilded lantern rising above, and the pediment decorated with gilt winged figures blowing trumpets, and the spandrels of the large arch with two finely-designed nude figures in bas-relief. Of the collection in this palace we say nothing at present; it is a more or less permanent loan collection of ancient art of different kinds, and may afford matter for consideration on some future occasion. But as a piece of architecture alone the Petit Palais, independent of its contents, is well worth a visit; it is one of the most remarkable of recent architectural creations.

NOTES.

Imperial Telegraphic Communication.

WE have received from the Eastern and Eastern Extension Telegraph Companies a report of the House of Commons' debate on May 22, with the companies' comments. They answer the charge of excessive tariffs by pointing out that if they reduced the tariff to India from 4s. to 1s. a word, then if there was no increase of tariff there would be a loss of over a quarter of a million a year. It is, therefore, gratifying to learn that the Indian Government has induced the Company to promise to lower its charges almost immediately to 2s. 6d. per word, and if this prove successful to 2s. This is the first reduction they have made for twenty-four years. In order to prove the impossibility of a shilling rate to India the Company give a calculation showing that even if they laid a new cable, which was fully loaded all the year, then they would only make a profit of 1·6 per cent on the capital expended. They calculate the capacity of the cable as seven and a half paying words per minute. If, however, they doubled their initial outlay and got a cable of four times the carrying capacity, then the enterprise would not appear so hopeless. They state that reductions of tariffs can only conveniently be made during the periodical International Telegraph Conferences. Perhaps this is the reason why these conferences do not occur very often. There is to be one in London next year. The explanation the companies give of why they recently proposed to lay the Australia-Cape-Great Britain cables without any subsidy, although they had three years previously asked for subsidies, is that their financial position is much sounder now owing to the great increase of their business due to gold speculation in Western Australia. It was rather unfortunate that their offer was made immediately competition viâ the Pacific was definitely agreed upon by the British Government. At the same time they offered to reduce the tariff considerably. We are glad that the cable companies are realising that they must bestir themselves. The agitation for a general reduction of rates, more especially of the rate to India, which, as we pointed out last year, is a most unfair one, is by no means over.

New Bridges in New York.

FOR more than seventeen years the Brooklyn suspension bridge has enjoyed the distinction of being the only means available for vehicular and pedestrian traffic between the two cities situated on opposite sides of the East River. A second connecting link will presently be furnished by the new East River suspension bridge now in course of construction, and plans have now been completed for a third bridge between Manhattan and Brooklyn. These structures will be situated at the narrow neck of the river separating the business part of New York from Brooklyn, the old bridge being nearest the bay, the new East River bridge occupying a site about three-quarters of a mile further inland, and the third bridge will be between the two others. The suspension system of construction is to be followed in the last-named structure. Although considerably delayed by insufficient deliveries of material, good progress is now being made with the new East River bridge. The masonry anchorages at each end are nearly completed, and the steel towers have been carried up to the level of the floor of the bridge. Unless further delay be occasioned by the steel contractors, it is anticipated that the towers and the shore span of the bridge will be finished during the summer months. If not remarkably beautiful, the new structure will be the largest, and probably the strongest, of its type in the world. It is to be about 118 ft. in width and will include four "trolley tracks," and two elevated railway tracks are to be carried between the stiffening trusses; two 18-ft. roadways will be supported on a cantilever extension of the floor beams;

while above the trolley-tracks there are to be two bicycle tracks, each 8 ft. wide, and two footpaths each 12 ft. in width. The four foundations for the towers are timber and concrete caissons, resting upon bed-rock, and above these are solid masonry piers, two for each tower. Upon the top of the masonry, 23 ft. above mean high-water level, are massive pedestal blocks of granite, one at each corner of the piers. Cast-iron column pedestals of massive proportions are placed on the granite blocks, and upon these are to be erected the steel columns forming the principal members of the towers. Eight columns are included in each tower; the columns will measure 310 ft. high by 8 ft. square at the base, and 4 ft. square at the top. The main trusses will be continuous from end to end and will rest on roller bearings at the anchorages, whilst they will be supported by means of rocker shaft bearings at the main towers. The third East River bridge will have towers 330 ft. in height, constructed of steel, and each pair of towers will rest on one foundation of masonry containing large wells roofed over with concrete; the caissons will be of similar construction to those at the second bridge. On the Brooklyn side they will rest upon rock at about 95 ft. below water-level, and at the Manhattan side upon gravel. There are to be four lines of stiffening trusses extending from anchorage to anchorage, but discontinuous at the towers. The width of this bridge will be rather greater than that of the other bridges, and the general arrangement of the roadways will somewhat resemble that of the new East River bridge.

The Metropolitan Asylums Board.

AN interesting pamphlet has been prepared by the Metropolitan Asylums Board of London as a guide to its exhibits in the Social Science Section of the Paris Exhibition, and as a record of its history and work. Like most of our British institutions it began in a small way. The Board was created in 1867, and its first duty was to undertake the care and treatment of "poor persons" suffering from fever or small-pox or from imbecility (not lunacy). In 1883 the civil disabilities attaching to admission to the hospitals of the Board were removed, and thereupon the number of patients rapidly increased. By the Public Health (London) Act of 1891 patients obtained the advantage of gratuitous treatment, and the number of fever cases treated by the Board leapt from 7,809 in 1891 to 16,276 in 1892, and to 25,094 in 1899. That this increase was not due to the greater prevalence of infectious or contagious diseases is proved by the statistics given in the pamphlet; these show that the cases of scarlet fever admitted to the hospitals in 1891 were only 46·84 per cent. of the cases notified, whereas in 1899 the percentage was 74·34; in a similar manner the percentage of diphtheria cases admitted increased from 25·07 to 69·69. Among the exhibits which are referred to in the pamphlet are models of the Board's ambulance carriages and steamboat, the floating smallpox hospital, and an ambulance station. The most important models are those of the temporary Fever Hospital at Tottenham, built in six weeks from the designs of Messrs. A. & C. Harston, during the epidemic of scarlet fever in 1892, and the permanent Fever Hospital at Shooter's Hill, recently erected from the designs of Mr. T. W. Aldwinckle. The importance of the Board's work can scarcely be over-estimated, and this record of its labours cannot fail to be both interesting and instructive to sanitarians of all countries.

Flushing Water-closets.

AT a meeting of the Hull Corporation Water and Gas Committee on the 11th inst. the Engineer's Report as to the by-law in regard to flushing cisterns was considered. The Engineer reported in favour of a 2½-gallon flush, observing that to place it higher was to offer a premium on badly constructed water-closets. He seems to have forgotten that it is not only a question of cleaning the basin, but of keeping the drain clear. The Mayor, who seems to have most sensible views on the question, made a protest in favour of a 3-gallon flush, observing that much of the evidence relied on by the Engineer in favour of a smaller flush came from Water Companies who were financially interested in restricting the use of water; and he said his opinion as to the desirability of a 3-gallon flush was shared by every architect in the city. Eventually an amendment that the flush should be "not less than two gallons and not more than three" was carried. We congratulate the Mayor and the Committee on their well-advised action in the matter. Perhaps some day the London authorities may recognise the necessity of altering the by-law, passed no one knows how or why and in defiance of scientific evidence, which gives the London Water Companies the power of restricting their consumers to a flush inadequate for proper sanitary conditions.

The Elan Valley.

THE Birmingham Corporation are making progress with their scheme for obtaining a water supply from the Elan Valley, near Rhayader, in county Radnor. The Act of 1892 empowers them to execute the works upon which, it is calculated, about seven millions sterling will be expended. The Corporation have acquired an area of about 45,600 acres, whence water is to be gathered for supplying six great reservoirs, one of which, Caban Côch, covering 496 acres, is nearly completed, by the construction across the river Elan of a dam which is 120 ft. high, 120 ft. thick at its base, and 220 yards long, with a storage of eighteen thousand million gallons of water at 800 ft. above sea-level. Two other reservoirs will be made by damming the river Elan, and three more by damming its confluent, the river Claerwen. Mr. Mansergh, C.E., is the engineer for the works. The aqueduct is to convey sixty million gallons daily to the Frankley reservoir near Birmingham, and comprises twelve miles of tunnels in sections. The construction of Caban Côch reservoir involves the demolition of Cwm Elan, a house inhabited for a time by Shelley.

Leicester Society of Architects.

THE twenty-seventh Annual Report of the Leicester and Leicestershire Society of Architects is at all events an example to most other societies of the kind in the way of artistic form. The paper is obviously specially selected, the type an old-face one of very fine and bold character, and the pamphlet is also illustrated by four very good sketches, reduced from those by Mr. Shirley Harrison, who gained the Society's Travelling Studentship last year. From the Report it appears that the total number of members on the roll is eighty-six, the same as last year. Among the matters recorded in the Report is the visit of the Society to Hampton Court, which appears to have been a very successful one. The Society's library is on the increase, and the question of the better housing it is now becoming important. It is the intention of the Council to reproduce sketches or measured drawings of architectural work of interest in the county of Leicestershire in the future Annual Reports of the Society, by way of keeping up a record of some of the old works in the county.

The late Mr. J. T. Irvine.

IN an obituary notice we record, with great regret, the death of Mr. J. T. Irvine, whose name and personality were known to so many of our readers as clerk of works on several of Scott's cathedral restorations, and to whom Scott, as well as others, undoubtedly owed much of their knowledge of the detailed history in stone of the cathedrals which were under his immediate care. The tracing out of the meaning of every stone in an ancient building seemed to be the end and aim of Mr. Irvine's life; no trouble was too great for him to take in such a task, at which he seemed to work from pure love of the subject rather than for any gain to himself. Perfectly simple and unassuming, he nevertheless had a natural dignity of manner which impressed all who came in contact with him, and he was universally respected by all who knew him. His loyalty and devotion to the great Gothic architect under whom he worked for so many years was a fine trait in his character, and was met, we believe, by a corresponding trust and regard on the part of Scott towards his faithful assistant.

The Dowdeswell Galleries.

AT Messrs. Dowdeswell's there is an exhibition of the works of old masters of the early Italian, Flemish, and Dutch schools, numbering twenty-three pictures in all. No. 2 on the list is a powerful painting of the head and shoulders of a man reading, wearing a large hat, the figure subdued in colour with the mellowest of golden background. So fine a picture makes one regret the untimely death of the artist, K. Fabritius, at thirty years of age. No. 5 is a portrait of the painter, by William Dobson, painted between 1610-1646 (one of the Peel heirlooms). Dobson was a struggling artist discovered by Vandyck, and, like his patron, seems to have possessed style and power rather than the higher qualities. No. 6 is a portrait by Nicolaas Maes, painted in the latter half of a long life, under the French influence that divides his later from his earlier work. The difference is so marked that students have till recently held them to have been two men of this name. "The Portrait of a Gentleman," painted in the manner of a miniature, is evidently the work of a master who was painting for the public. No. 8 is a Mierevelt done between 1567 and 1641; a Portrait of a Lady," in the greatest manner of the Dutch school, beautiful in colour and detail and monumental in design. A picture of the first importance is that of an altar piece by Giangiacomo Fava, called Macrino D'Alba, dated about 1500, of three

panels. The artist is a painter of the Lombard school not very well known to the public. Of other pictures by the early Italians, No. 12 is the most beautiful, "The Virgin worshipping the Child," a saintly picture painted with delicacy and much sympathy.

Dudley Gallery Art Society.

THE Water-Colour Exhibition of the Dudley Gallery Art Society is a more interesting one than usual; that is to say, the proportion of works of original character, in comparison with those which are merely of ordinary type, is larger than we have usually found at this gallery. The work of largest size, Mr. Sylvester Stannard's "The Village Smithy" (9), is not, it is true, more than a solid and careful piece of painting of a village scene; good as far as it goes, but not of special interest. It is among the smaller works that we must look for the real interest of the exhibition. Among these the best are perhaps Mr. G. Marks's two beautiful and highly-finished little pictures "Gorse" (275) and "Springtime" (281). Mr. Walter Severn, the President of the Society, is less conventional than usual in his "Gorse and Asphodels, Basses Pyrenées" (234), in which the foreground and middle distance are admirable. Mrs. James Jardine, a name we do not recollect before, shows both power and versatility in her "Kilmartin Moor" (29) and "St. Moritz" (31), the latter a snow scene; two subjects of very different class, and both equally well treated. Miss Margaret Bernard contributes, as usual, some examples of sketches in a very broad and free water-colour style; "Lelant Church, Cornwall" (13) is perhaps a little too sketchy; "Waiting for the Fishing Season" at the same place (54) is a characteristic study, in which a row of fishing craft drawn up on the beach till the time comes for launching is the salient point. In "Fishing Boats off Scarborough" (41) Mr. F. G. Coleridge, who usually paints Thames scenes, has made a good sea; so has Mr. David Green in "An Evening Breeze" (239), a bit of sea painting full of freshness and movement. Mr. Reginal Jones has two large works, "A Fir Wood" (91) and "A Birch Wood" (117), in both of which the study of tree trunks in the foreground is the principal object; in the first-named work there is however a fine landscape effect seen between the stems, and this is in every way an admirable work, in a broad style and full of fine colour. Architectural subjects are rather numerous; among them "St. John's Bridge, Tewkesbury," (110) by Mr. Berenger Benger; "The Temple of Castor and Pollux, Girgenti" (133), by Mr. G. Birkbeck; "The Temple of Romulus, Rome" (149), by Miss Catherine Thornton; "The Ponte Vecchio, Florence" (168), by Mr. R. S. Standen (very good); "Amiens Cathedral" and "Rouen Cathedral," by Mr. Medleycott (175 and 206); "The Cloister, Seville Museum" (176), a carefully-executed monochrome by Col. W. Bell; and "The Hall, Bradford-on-Avon" (209), by Mr. B. Benger. All these are what may be called good architectural water-colours, but except Mr. Standen's "Ponte Vecchio," hardly rise beyond that level. Among the works of special interest may be named Miss Gilchrist's "Village-street, West Love, Cornwall" (49); Miss Margaret Bernard's "Stones at Carnac" (68); Mr. Moleyn's "Killiney Bay, co. Dublin" (72), with a fine treatment of the distant headland in sunlight; Mr. R. A. K. Marshall's "The Southdowns, from Cowbeach Hill" (79); Mr. Duassut's "The End of the Village" (84); Mr. W. H. Watson's powerful sketch, "A Gleam of Light, Eskdale" (101); Mr. Carlisle's "October Afternoon on the Waveney" (107); Mr. F. Dixey's "Westenhanger" (125); Mr. Bruhl's "A Norfolk Wherry, Beccles" (138) an upright drawing with a fine sky; Mr. A. Stevens's "Passing Showers" (152); Mr. Standen's little work, "A Tuscan Farm" (159), interesting both in an artistic and topographical sense; Miss Gilliat's "Broadmoor" (171); Miss Sloane's interior, under the title, "Stocking Weaving" (202); Mr. C. J. Adams's "An Autumn Afternoon" and "A March Day" (214 and 257); as well as others which we have not space to mention. There seems to be a distinct improvement in the general quality of the Society's exhibitions.

Mr. Norris's Water-Colour Drawings.

AT the Fine Art Society's Gallery is a collection of water-colour drawings by Mr. Hugh L. Norris, which are of considerable interest. Mr. Norris has a style and feeling of his own, and though at first sight we thought the drawings had rather a washed-out appearance, we ended by finding the collection a real pleasure, as the work of an artist who translates Nature in his own way, and has a delicate perception of colour, although it is still true that his style is a little deficient in vigour; he reduces things rather too much to masses of colour with little detail. Thus, in "A Corner of the Orchard" (21), the grass, so to speak, is not grassy enough. But in many cases the balance of the different portions is complete, and the want of more detail consequently is not so much felt. "Stratford-Tony Church" (22) is a charming work; also we may especially name "Near Laggan, Inverness" (19), with its various coloured hills and rainy sky; "Ragwort Almoners" (27), with the mass of the bright blossoms in the foreground; "Woolhampton" (30), where the texture and colour of the distant trees present an admirable bit of artistic handling; "Reeds for Rick-Thatching" (39); "Coombe Bissett, stormy day" (43), and "A Corner in Nature's Garden" (47). These are among the best, but there are a good many others well worth attention.

ARCHITECTURE AT THE ROYAL ACADEMY.—IV.

IN our last notice we accidentally passed over Mr. Gervase Bailey's clever little drawing "Design for the Hall of a Country House (1,724); it is true that it looks so very "rustic" that we should have rather called it "Hall of a Farmhouse," but the treatment of the plain timber work, with some gilt (?) metal applied as a sheathing here and there, is original; also the manner in which the lamps are inserted in the wooden framework. Still, it is not such a hall as we should expect to find in what is usually called a "gentleman's house," and if that is what it is meant for, this is one among other examples in the exhibition of the present tendency to over-acted homeliness in the finish and fitting of houses.

Mr. Nicholson's "The Library, Westbrook Hall" (1,755), illustrated in the present issue, is an admirable water colour, which shows in a truthful but not laboured manner the effect of the Turkey carpet, of the wood, green-stained or painted a sickly nondescript green or grey, in accordance with the prevalent taste, and of the fireplace with its little shrine over, and the painted picture in the arch above. As a matter of architectural design, the two arches, one enclosing the ingle nook, the other forming the entrance to the bay window, have a bold effect, and we have no doubt the room is a very nice one, but one cannot help thinking that in this as in some other cases the position of the drawing is largely due to its excellence as a water-colour. Mr. Baillie Scott's "House at Cobham: The Hall" (1,756), is a still more marked revolt against elegance or grace in domestic interiors; the hall looks really more like the tap-room in an old country "public"; as such it is a most interesting old room, and well worth preservation. So is Mr. Edgar Wood's "House, Edgerton, Huddersfield" (1,774), a charming old stone manor house considerably decayed, and looking most picturesque as seen through the trees grouped in front; there are one or two unusual and interesting details about it, too, which make it well worth the trouble of the excellent water-colour drawing in which it is shown. That is at all events the impression that people not familiar with the ways of the modern architectural artist would gather from the drawing; in reality we presume it is intended as a new house. It is almost needless to say that no plan is added; those who make this kind of drawing and design never see the good of a plan, and evidently think that would only be spoiling the picture.

A very small drawing, or collection of small sketches, "The Steep-house, Keswick" (1,770), by Mr. W. H. Ward, is interesting chiefly on account of the plan, which is treated in a very interesting and original manner; the management of the entrance, formed in the centre of a concave curve of the house wall, and with a terrace with a convex curve, the reverse way, emphasised by symmetrically planted shrubs, is very neat, and there are other points in the plan that are suggestive of effect. Mr. T. G. Lucas, in the drawing of "Sandhill Close, Hitchin" (1,783) shows not only a plan but a compass—a most unusual attention in an Academy drawing; there is a certain character in the high roofs and widely-projecting eaves of his house and the massive way in which the chimneys are treated; the plan shows the frequent mistake, of which there are several other examples in the room, of fronting the drawing-room and dining-room the same way, in this case west—good for the drawing-room, but bad for the dining-room, at least in summer. Mr. Macartney's "Frithwood House" (1,790: no plan) is a conscientious reproduction of a brick house of the eighteenth century; this kind of reproduction of the dullest period of English architecture is carried out with even more conscientious baldness in "Bradfield College; New Boarders' House" (1,802), by the same architect. This is an excellent drawing, and the long flatly treated red-brick house with the commonest type of sash windows would no doubt, as a genuine house of the period imitated, have an interest as a piece of solid and unpretentious building of the type associated with its date; but apart from the association, what is the architectural interest of such an erection? There is not a detail in it of any beauty or interest for its own sake, and there is no attempt to give expression to the plan by any architectural modification of the stolid plainness of the exterior. The windows of the dining-room of the master's house exactly balance the windows of the three boys' studies on the other side; the boys' dining-hall, which occupies the central portion of the front, is again distinguished in no way from either of these; the same dull, blank, expressionless treatment runs from end to end of the building. We presume the argument is that in actual eighteenth century buildings of this type the windows always were arranged in blank regular rows with no relation to the interior arrangements. So they were, and a wretched dull architecture it was; interesting now from association and because it is connected with an interesting period in English social history; but as an architecture for deliberate imitation and "revival" it is too futile. The Gothic and the Greek revivalists were ten times better than this; they at least imitated something that was worth imitating.

Mr. Arthur Stratton's "A House by the Sea" (1,791) hardly displays the strongly marked coast character which one would associate with the specific title, but the plan is good, and shows considerable ingenuity in varying the character of a set of rooms all of which are to overlook the sea from the same front. "Welders, Chalfont St. Peters" (1,797), by Mr. Macartney, is also a very archæological piece of architecture, but there is at all events something picturesque in the treatment of the three

gables with the break and the drop parapet separating them. A thumbnail plan is scratched in in the corner. At the Salon a drawing with no more plan than that would not be hung; but in England, as already observed, when architects add a plan at all to their drawings for exhibition, they do it as if they were ashamed of it, and hoped no one would notice it.

Mr. Nicholson's "Ickleton Grange" (1,796) is a picturesque house, with sketch plans added; Mr. Baillie Scott's "House at Windermere" (1,804: no plan) impresses one as a nice sketch of an old house. Mr. G. J. J. Lacy's "Design for a Country House" (1,801) is illustrated by plans on the same scale as the elevation; a white and half-timber house, with very high roofs; the plan is one of those which shows the drawing-room and dining-room with the same bay windows with the same aspect. Mr. Seth-Smith's "Two Houses at Godalming" (1,805) unfortunately has no plan; the treatment of these semi-detached houses, with two square bays of half-timber work projecting from a long unbroken mass of building in their rear, is picturesque and unusual, and one would have liked to know how these projections were worked into the plan. Mr. Belcher's "Château Mauricien" (1,811) is a house of more importance and dignity than most of those in its neighbourhood; no plan (though there is ample spare space on the paper for it); the treatment of the immediate surroundings of the house is shown, with terraces, balustrades, and *treillage* (on which subject it may be remembered that the architect read a paper some little time since); the house itself is a not very recondite treatment of French Renaissance; there is no obvious reason why one portion should have a visible roof and the other should not. The drawing has evidently been finished off in a great hurry, otherwise the design might have been more advantageously shown. Mr. May's frame of exterior and three interiors of "Homeside, Wimbledon Common" (1,809) was illustrated in our issue of June 2. The interiors serve to show that it is possible for an interior of staircase, hall, and dining-room to be home-like without being devoid of dignity.

Mr. Mileham's "New Church of St. Mark, Plumstead, with Institute, Parish Hall, and Parsonage" (1,812), is really a group of buildings of which the church only forms the background. The houses are arranged so as to form a kind of bay or recess, at the back of which are two arches forming the entrance to the church, with a wall above them, of which the upper portion is pierced with small openings for bells; the building on the left, with its gable with reversed curves and its tall chimnies ending in gablets, is very original; the opposite block on the right seems to have no connexion with it and is perhaps no part of the scheme; there is no plan to show, but this is a very interesting bit of work. Mr. Campbell Jones is to be commended for having given plans of both of his two houses at Letchmore Heath and Tunbridge Wells (1,835, 1,836), though they are not remarkable in other respects. Mr. Ashbee's "38, 39, Cheyne-walk" (1,840: no plan), is a very well executed drawing of a house front in Old London style, brick below and plaster or rough-cast above, with all the small-paned windows right up to the face of the wall; the iron railing, decorated with gilt ball finials, is well designed, and the whole thing has character, though rather of an archæological kind. Mr. Walter Cave's "A Modern Country House in the Eighteenth Century Manner" (1,843) frankly avows its archæological character, but this is a very interesting study; it consists of a small but minutely finished elevation of a large mansion in brick with stone dressings, with wings projecting forward and connected with the main block by quadrant colonnades, as in so many houses of the "Vitruvius Britannicus" type; the main building is in this shape on plan H; the complete plan is given, as well as a block plan on a smaller scale showing the surroundings; in front of the house is a great half-circle of trees with its centre axial with the house; on the garden side is a long canal pond at right angles to the house, and with a large symmetrical parterre on each side. The whole thing has been very well worked out, though one cannot help reflecting that all the general lines of the scheme might have been carried out just as well with a better designed and more interesting piece of house architecture as the centre of it.

"Additions to a House in Hertfordshire" (1,847) is a line perspective by Mr. R. W. Paul, with a block plan showing that the additions consist in two new blocks added, in a rather effective manner, on each side of the square mass of the older house; a formal garden forms a portion of the design. Mr. Matear's "Branksome, Buxton" (1,855) was published in our issue of December 2, 1899; it is a fine and bold pen perspective of a large house in that kind of mixture of half-timber gables and octagon bays which has been often employed in modern houses; a small plan is given, but is too high to see; the design has hardly the originality or artistic feeling which other work by the same architect would have led us to expect from him. Mr. Horsley's "Additions to Balcombe Place" (1,856; no plan) is a pen drawing of portions of a house which make an effective group, but of which, in the absence of a plan, it is impossible to understand which is the old and which the new part; the interior of the music gallery is shown in No. 1,860, in a drawing that is rather overworked with line shading, and hardly does justice to the probable effect of the room.

In Mr. Baillie Scott's "Dining-room, Glen Falcon, Isle of Man" (1,863) we came again on the type of what we are inclined to call the æsthetic kitchen, with a dresser for a dining-room table, and a frieze of very large flower forms round the upper part of the wall, which seems rather out of scale as detail. The square posts with small carved pierced brackets at top have a slightly Oriental appearance. "House at Crowborough: the Dining-room" (1,870) is of the same type, in this case with dull-greenish woodwork and a colour frieze and other ornamentation. Both these drawings are quite the reverse of commonplace, whether in conception or execution, but they both illustrate a tendency which has lately shown itself among the younger school of architects towards what we call an exaggerated simplicity and homeliness in the treatment of interiors; applying to a house a kind of treatment hitherto considered more characteristic of a labourer's cottage. There is a wholesome feeling about this, in so far as it implies a perception that anything is to be preferred to ostentation and pretentiousness of style and decoration; but one feels that this rather tends to become an ostentation in its own way, a kind of exaggerated profession of simplicity and sincerity; and after all, refinement of effect and of line go for something in an interior; we hardly want to see columns reduced to mere posts, and tables to kitchen dressers, and everything harsh and angular in line; and when the novelty of this kind of attempt has worn off, it will probably be abandoned, though perhaps some good suggestions may be evolved out of it for permanent use.

Mr. Caröe's view of "South Lytchet Manor" (1,865), was illustrated in our issue of May 26, and, as there explained, consists of a further enlargement and a recasing with new stonework of an old house which had been previously added to. This, like another design to which we referred last week, shows an attempt to connect the conservatory architecturally with the main building, the conservatory and library being here treated as symmetrical wings on opposite sides, an arcaded loggia continuing and connecting the line of their windows. The conservatory is very successful, though one cannot help feeling that the lighting that does for a conservatory must be rather too much for a library. Mr. A. C. Martin's "A House: 1899" (1,880), is rather ostentatiously plain in its interior, though not without some character; but the plan is of interest; the gallery connecting drawing-room and dining-room, with a bay and the garden porch opening from it, is a good feature. "Hill Crest" (1,882: no plan) by Mr. Mr. Philip Tree, is a pretty drawing chiefly noticeable for a nicely-arranged garden; and Mr. Foster's "The Priory, Steyning" (1,883) is noticeable for the effectiveness and artistic character of the small water-colour drawing in which it is shown, though there is nothing out of the way in the design itself. Mr. Caröe's "Episcopal Palace, Bristol" (1,889) has been illustrated in our issue of November 25, 1899; it is hung too high here to be properly seen. Mr. Inigo Triggs's "Entrance Lodge" (1,888) shows, in an effective coloured drawing, a lodge arranged with a gateway in the centre and the habitable portions abutting against the centre at an oblique angle; the design is simple but would be effective. Mr. Streatfield has tried a special effect which he calls "A White House" (1,896), with white walls, wooden mullioned windows, and a red-tiled roof; the plan is poor and full of narrow passages. Mr. Horace Field shows a "House near Cambridge" (1,908), which apparently is rough-cast (or something white) framed with a brick plinth, quoins, and horizontal band, making the walls into large white panels with brick framing. The ground plan, with a rather wide gallery connecting the dining-room and drawing-room, is good, and it is to be noted that the aspects of the two rooms are not, as in too many plans in the room, identical. There is a curious apparent affectation of old-fashioned line work, like old engraving, in the execution of the drawing, and the way the cobble-stones and grass are put in with a mechanical regularity; this is, however, a perfectly harmless amusement. Mr. Thos. E. Pryce shows a pen drawing of an "Ingle Nook" (1,902), with pilasters and bookcases in combination; and Mr. Harold Falkner a good pen drawing of "Strangers' Corner, Farnham" (1,907), in which, however, the interest lies more in the trees than in the building.

Mr. Ernest George writes to say that his "Holwell" is not an addition, as we implied in our last article, but an entirely new house. The small-scale elevation in the corner gave the impression that this represented the house before it was remodelled; but we see on referring to the drawing that it is the elevation of the side opposite to that shown in the perspective view. The addition of a plan would have made this clearer, however.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE fifteenth general meeting (business) of the Royal Institute of British Architects for the present session was held on Monday, Mr. E. A. Gruning, Vice-President, in the chair.

The minutes of the last meeting having been agreed to,

The report of the scrutineers appointed by the annual general meeting to direct the election of the Council, Standing Committees, &c., for the year of office 1900-1, was read, and the following were declared duly elected:—

President.—Mr. William Emerson.

Honorary Secretary.—Mr. Alexander Graham, F.S.A.

Vice-Presidents.—Messrs. J. Belcher, A.R.A.; J. McKean Brydon; E. A. Gruning; J. Slater, B.A. Lond.

Members of Council.—Messrs. F. T. Baggallay; Thomas Blashill; G. F. Bodley, A.R.A., F.S.A.; James Brooks; W. D. Caröe, M.A. Cantab., F.S.A.; T. E. Collcutt; W. Milner Fawcett, M.A. Cantab., F.S.A.—John Alfred Gotch, F.S.A. (Kettering); E. T. Hall; H. T. Hare; E. W. Mountford; Beresford Pite; G. H. Fellowes Prynne; R. Phenè Spiers, F.S.A.; H. Heathcote Statham; Leonard Stokes; Paul Waterhouse, M.A. Oxon.; Aston Webb, A.R.A., F.S.A.

Associate-Members of Council. — Messrs. R. Shekleton Balfour; A. S. Flower, M.A. Oxon, F.S.A.; J. S. Gibson; H. V. Lanchester.

Representatives of Allied Societies. — David Barclay, Glasgow Institute of Architects; Sir Thomas Drew, R.H.A., Royal Institute of Architects of Ireland; William Glover, Northern Architectural Association; W. Carby Hall, Leeds and Yorkshire Architectural Society; C. King, Devon and Exeter Architectural Society; F. H. Oldham, Manchester Society of Architects; S. P. Pick, Leicester and Leicestershire Society of Architects; J. Smith, Sheffield Society of Architects; F. W. Wills, Bristol Society of Architects.

Representative of the Architectural Association (London).—Mr. W. H. Seth-Smith.

Auditors.—Messrs. W. H. Nash, Fellow; and H. A. Satchell, Associate.

Standing Committees: Art Standing Committee.—Messrs. J. Macvicar Anderson; G. F. Bodley, A.R.A., F.S.A.; James Brooks, J. McKean Brydon, W. D. Caröe, M.A., F.S.A.; T. E. Collcutt, Ernest George, H. T. Hare, E. W. Mountford, R. S. Balfour, J. S. Gibson, H. V. Lanchester, A. N. Prentice, W. H. Romaine-Walker, J. W. Simpson, Alfred Waterhouse, R.A., LL.D.

Literature Standing Committee.—Messrs. J. Bilson, F.S.A.; Alexander Graham, F.S.A.; B. Ingelow, A. S. Flower, M.A. Oxon., F.S.A.; W. A. Pite, G. H. Fellowes Prynne, Sydney

Smirke, R. Phené Spiers, F.S.A.; J. Humphreys Jones, B.A. Lond.; A. N. Prentice, R. Elsey Smith, H. Heathcote Statham, C. H. Townsend, Paul Waterhouse, M.A. Oxon.; L. Waterhouse, M.A. Cantab.; P. S. Worthington, M.A. Oxon.

Practice Standing Committee.—T. Batterbury, S. Flint Clarkson, T. Harris, W. H. Atkin-Berry, C. H. Brodie, H. Hardwicke Langston, G. Hubbard, F.S.A.; A. H. Kersey, J. Douglass Mathews, W. Hilton Nash, Sydney Perks, A. W. Tanner, Beresford Pite, J. Osborne Smith, E. Woodthorpe, M.A. Oxon.; W. H. White.

Science Standing Committee.—Lewis Angell, M.Inst.C.E.; Thomas Blashill, F. R. Farrow, H. W. Pratt, S. B. Beale, H. W. Burrows, Max. Clarke, H. D. Searles-Wood, P. G. Smith, A. S. Snell, B. J. Dicksee, M. Garbutt, W. C. Street, B. Tabberer, K. D. Young, G. Pearson.

The following applicants for membership, found by the Council to be eligible and qualified according to the charter and by-laws, were elected :—

As Fellows.—Ibrahim Shaik Daúd Ahmadi, L.C.E. (Bombay), Fellow of Bombay University, Executive Engineer P.W.D. Bombay, and Bijapur, India; J. Bain, Newport, Mon.; S. F. Bartleet, London; H. Budgen, Cardiff; A. A. Cox, Grissell Medallist, 1886, Godwin Bursar, 1890, London and Montreal; T. Dinwiddy, Greenwich; F. Flint, London; F. L. Pearson, London; N. G. Pennington, London.

As Hon. Associates.—G. J. Frampton, A.R.A., London; F. N. Jackson, London.

RETORT HOUSE ROOFS.*

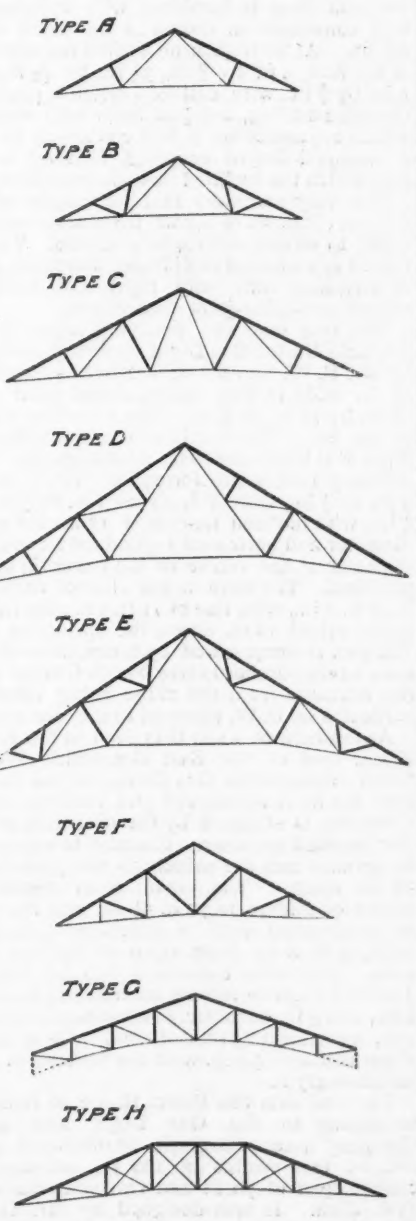
THE chief roofs connected with gasworks are constructed over retort houses and over purifying houses. The former are generally erected entirely on walls and slated, the latter are very often open both at sides and ends. Ample ventilation above the eaves is of primary importance in a retort house roof, but generally speaking no glass is introduced in the covering, and very little sunlight admitted except in some cases through the ventilator. The house may be adapted for either a single or a double stack of retorts, and may be of the ground floor or stage floor type of erection according to the system of working adopted, the latter needing higher walls or a greater amount of clear headway than the former. Suitable openings are usually provided in the walls for the admission of light and air above the level of the retort benches, and the ridge ventilator is generally made to extend from end to end of the building. Ventilating tubes or towers are sometimes added, and in short every effort is made in a well-considered design to provide roof ventilation free from wind currents at the sides of the building. In the author's paper read before this Institute in 1891, dealing with the effect of wind-pressure on retort house roofs and gasholders, he pointed out the fact that retort houses were as a rule placed in sheltered positions, and that the strains produced in a truss fixed upon the side exposed to the wind were greater than the strains produced in a truss that was fixed on the lee-side only.

The site for a ground floor type of house should present an exceptionally good foundation in order to be able to lay the foundation of the retort stack at a depth of about 9 ft. 6 in. below the floor line, and an underground passage at least 7 ft. wide in front of the stack. The clear space in front of a retort stack should not be less than 18 ft. When mechanical means are adopted for charging and drawing the retorts 22 ft. may be allowed. The Minutes of Proceedings of the Institution of Civil Engineers (1898-99, Pt. IV.) Vol. CXXXVIII., contains an interesting article on "Labour-saving Appliances in Gasworks," by Mr. C. C. Carpenter, M.Inst.C.E., to which the author need not further allude beyond stating that mechanical stoking has created a necessity for wider spans, owing to the position of the charging machine, which prevents the handle of the scoop from getting within about 7 ft. from the mouthpiece. The inclined retorts at Kensal Green show an intermediate hopper fixed high enough to discharge into the charging hopper. This causes the height of the building to be greater than in the case of hand stoking. With sloping retorts the span, as compared with horizontal retorts, is not reduced, since with the double arrangement usually introduced a distance is left in the middle sufficient to allow of the machinery for charging, and instead of a house containing one bench of 20 ft. retorts, as with horizontal fixture, there are two benches of 20 ft., the position of which also increases the height of the building. The floor in front of the stack is usually made to slope slightly towards the stack, and is paved with fire bricks or other hard material. Preference is usually given to the stage floor type in all cases where the site naturally favours this construction.

The chief characteristic in a roof is its "principal," which may be of triangular, quadrilateral, segmental, or a combined outline. As a rule retort house roofs usually have a straight inclined surface, suitable for slate covering, and capable of discharging rain and snow in an efficient manner. It may be interesting to note in passing that 1 lb. of snow at freezing point requires 150 units of heat to melt it, and to raise the temperature of the water obtained to 40 deg. Fahr., and that this effect can be produced on 3½ lbs. of snow (which is the usual weight allowed per square foot) by the consumption of 1 ft. of coal gas. The approximate weight of the kinds of slating used are as follows :—Ladies, 16 in. by 8 in., 5 cwts. per square. Countesses, 20 in. by 10 in., 5¾ cwts. per square. Duchesses, 24 in. by 12 in., 6 cwts. per square. Queens, irregular sizes, about 30 in. by 24 in., 8 cwts. per square. Imperials, 30 in. by 24 in., 10 cwts. per square.

They can be fixed directly on angle iron laths or Z iron bars without the introduction of woodwork by means of lead pegs or copper or zinc clips. The angle usually given to the rafters averages 1 in 1½, having a rise of one-third of the span, and this inclination gives an angle of 33 deg. to 34 deg. with the horizontal.

The following Types A to H present the forms usually adopted, from which it will be seen that the variation and applicability of each form of principal are mainly indicated by the number of the sub-spans, and divide themselves into two classes :—1. Those in which a brace radiates from one or more central points in the truss to each otherwise unsupported point, as in the case of each side to Types A and B. 2. Design in which the braces in a truss divide the same into a chain of triangles in a zigzag fashion, as in Types C and G, but in each type designed to transmit the strains produced at intermediate points to the end supports.



Type A is equally serviceable for large or small spans, and supports the rafter in a central position. Type B is of the same kind, but supports the rafter in two intermediate points. Type C also supports the rafter in two intermediate points, and resembles Types A and B in having the struts perpendicular to the rafter and in having no vertical members, but otherwise approaches the type of roof in which verticals are introduced in its general arrangement of parts and details of connexion. Type D is similar to Type A, but with longer rafters doubly trussed. Type E is the same as Type D except that the rafter is here divided into six parts instead of four. The use of either of these types depend upon the distance apart adopted for the purlins. The struts are short, and the main part of the bracing is in tension. So far the system is all that can be desired, but in the case of roofs hipped at the ends, or roofs in which vertical longitudinal bracing between the principals is required, the type of roof shown in Type F adapts itself more economically, especially where the span of the roof is made to be a multiple of the distance apart of the principals or of the longitudinal width of the hipped bay. This type is largely employed in the covering of retort houses.

Type G may be said to possess the advantage of a curved shape of tie, coupled with a favourable angle at its springing, in regard to the direction of a vertical reaction at the point of support. The lower portions shown dotted do not actually form part of the truss, but are added to contribute a vertical connexion to the walls or columns supporting the roof. Type H, compared with Type F, provides a more perfect stiffening of the rafter at its foot, caused by the shorter intervals between the supported points, and presents a suitable framework when, as in retort house roofs, the covering must be interrupted to allow ventilation. By the adoption of Types G or H an angle of considerable magnitude at the springing is combined with the advantage of a moderate depth in the centre of the truss. The dead weight of a structure increases with its span. A weight of 8 cwts. per square is ample to allow for a roof of 60 ft. span, or 10 cwts. for a span of 100 ft. if intended to carry slates on boarding. In roofs of 100 ft. or less span there is no economy in making the parts of steel. As stated by the author at the Institution of Civil Engineers in a discussion upon a paper on "Steel for Structures" (Minutes of Proceedings, Vol. LXIX.) in 1882, "sections of iron and steel adapted for roof purposes were comparatively so small that an error in the position of the holes became serious, and he thought that in the adaptation of steel for roofs it would be decidedly preferable to drill the holes." The use of steel, however, is now so generally employed that, provided the sections are not cut too fine and an ample margin of safety allowed, its success is established by the employment of satisfactory tests.

The roof over the passenger station at Sittingbourne is an example of Type C. The principals are 12 ft. 6 in. apart, 70 ft. span., having a rise or depth at centre of 14 ft. 9 in., with rise of tie-rod 3 ft. 6 in. The slope of the rafter is 22 deg., and the area covered 200 ft. in length. The cast-iron purlins are fixed so as to act as ventilators, and are 10½ in. deep.

The roof at Bow Common station (see lithograph plate), designed by Mr. G. C. Trewby, M.Inst.C.E., Engineer of the Gas Light and Coke Company, consists of seven main principals and six intermediate rafters, covering an area of 129 ft. by 57 ft. 6 in., enclosed by brick walls, with openings for doors and windows. The main rafter consists of a T.I., 5 in. by 5 in. by ½ in., with a rise of about one-fourth of the span. The ventilator extends the whole length of the roof, and the distance apart of the main rafters is 18 ft. 8 in. The purlins here employed are of the arched lattice form, span, 18 ft. 6 in., depth at centre, 18 in., depth at ends, 3 ft., having flanges of L.I. 3 in. by 3 in. by ⅜ in., bracing bars 2 in. by

* A paper read at a meeting of the Incorporated Gas Institute on June 13, by Mr. A. T. Walmisley, M.Inst.C.E.

$\frac{5}{16}$ in. by $\frac{3}{8}$ in. connecting plates. The roof is slated over L.I. intermediate purlins, 3 in. by 2 in. by $\frac{5}{16}$ in., placed 10½ in. apart, and has a slope of 25 deg.

Another example of Type C is given in the roof over the Newcastle and Gateshead Gas Company retort house, having a clear span of 97 ft. 8 in. The total height of the trussed rafter above the springing line is 28 ft., and the rise of the centre horizontal portion of the tie-beam is 6 ft. 3 in. The trussed rafter is composed of lattice work formed by bracing bars, 5 in. by ½ in., between top and bottom flanges of two angle irons, 5 in. by 5 in. by ½ in., depth, 3 ft., with web plate at the springing of the truss and at the connexion of the purlins. This braced member is curved round at the points of supports to form a level bearing upon a cast-steel base-plate. The lower tie-beam is formed of 2 L.I. 5 in. by 4 in. by ½ in., with web-plate 12 in. by ½ in., and the bracing bars to the truss are each of 2 [irons, 6 in. by 2 in. by ½ in., with distance washers and bolts 2 ft. apart. Slating laths, 2 in. by 1½ in. by ¼ in., L.I. 10½ in. apart, support the covering. The roof was erected by Messrs. Ashmore, Benson, Pease, & Co. of Stockton-on-Tees.

Type D is illustrated by the roof over the retort house at Folkestone, designed by Messrs. T. Hawksley & Son of Westminster. The principal consists of T.S. rafter 6 in. by 6 in. by ½ in., with struts of T.S. 3 in. by 3 in. by ½ in., and R.S. joist 4 in. by 3 in. by ⅜ in. The tie-rods are 2¼ in., 1⅜ in., 1½ in., and ⅞ in. diameter. The span is 60 ft. 9 in., with a rise of 13 ft. from springing line to central bolt in the rafter, and the rise of the tie-rod in the centre is 2 ft. 6 in. The roof is slated over L.S. purlins 1½ in. by 1½ in. by ¼ in., placed 10½ in. apart. In this design it will be observed that coupling-nuts are used, with a cotter-joint at the springing.

Another example of Type D is furnished by the roof over the retort house at Grimesthorpe station, designed by Mr. F. W. Stevenson. It consists of forty-four principals of 70 ft. span, having a slate covering at an angle of 30 deg. The depth of truss is 18 ft., and the rise of the tie-bar 4 ft., making a total rise above the springing line of 22 ft. The height of the springing line is 32 ft. above the stage floor, which is 12 ft. above the ground level. The roof is carried by brick walls on either side, and the rafters are composed of 5 in. by 5 in. by ⅝ in. T.S., with struts of I section 4 in. by 3 in. by 14 lbs., and 5 in. by 5 in. by 24 lbs. The inclined tie-bars are 4 in. by ⅝ in., and the lower tie-bar 6 in. by ⅝ in. The ventilator consists of two cast-iron girders or purlins 2 ft. deep of ¾-in. metal, connected to each principal by means of separate cast-iron gussets or brackets of the same thickness. The width of the ventilator in the clear is 7 ft. The main purlins are of 5 in. by 5 in. by ½ in. L.S. Longitudinal tie-rods, 1½ in. and 1⅛ in. diameter, connect the feet of the longest struts in each rafter, thus giving great rigidity to the whole roof.

The roof over the retort house at the Luton Gas Works, designed by Mr. W. R. Phillips and erected by Messrs. S. Cutler & Sons, consists of seven wrought-iron principals to Type D of 80-ft. span, formed of rafters 2 L.I. 6 in. by 3 in. by ½ in., main struts 2 T.I. 5 in. by 2½ in. by ½ in., intermediate struts 2 T.I. 4 in. by 2 in. by ½ in. Inclined tension flat bars 6 in. by 1 in., 6 in. by ⅞ in., 6 in. by ¾ in., and 4½ in. by ¾ in., with king rod 1 in. diameter. The purlins are 1¾ in. by 1¾ in. by $\frac{5}{16}$ L.I. 8½ in. centres, and the longitudinal tie-rods between principals are 1 in. diameter. The ventilator, 10 ft. wide by 3 ft. 6 in. high, is carried upon six principals, consisting of one centre and two side cast-iron standards, with rafters 3 in. by 3 in. and ½ in. T.I.

A roof of the form shown in Type E covers the retort house at the Crystal Palace District Gas Company, designed by Mr. Charles Gandon and erected by Messrs. Ashmore, Benson, Pease, & Co. The clear span between walls is 75 ft. 9 in., depth of truss 16 ft., with rise of tie-rod 2 ft., giving a total rise of roof above the springing line of 18 ft. Rafters T.I. 6 in. by 6 in. by $\frac{11}{16}$ in. Inclined tie-bars 6 in. by ½ in. and 3 in. by $\frac{11}{16}$ in., with lower tie-bars 7 in. by $\frac{11}{16}$ in., and 4 in. by $\frac{11}{16}$ in. Struts L.I. 4 in. by 3 in. by ½ in. and 3 in. by 3 in. by ½ in. The ventilator is composed of cast-iron ridge-plates connected to the rafters by continuous L.I. 6 in. by 4 in. by ½ in., and has a transverse width of 3 ft. The roof is slated.

The favourite type of truss for retort house roofs appears to be that indicated by Type F. This form is sometimes quoted as a queen-rod roof, the term "queen-rod" being applied to the suspending rods which act as vertical ties to the feet of the inclined struts. In the roof over the retort house at the Dublin Gas Works, designed by the late Mr. Jabez Church, the principals are 64 ft. 3 in. span, placed at about 6 ft. apart, and the foot of each rafter abuts into cast-iron shoes to which the rod is connected. The depth of the truss is 28 ft. and the rise of the tie-bar 5 ft. above the springing. The oblique struts and vertical ties have jaws or forks at their upper ends, where they are hung from the rafters by means of pins and screw ends, and at their lower ends they are connected with pinching nuts. The length of the roof is 296 ft. and includes a ventilating shaft in the centre of its area.

An excellent example of this type of roof (see lithograph) exists at the Litchurch Works of the Derby Gas Works, designed by Messrs. T. Hawkesly & Son. The principals are 52-ft. span, with a rise of 9 ft. 4½ in. from the springing line formed of T.I. rafters 6 in. by 5 in. by $\frac{7}{16}$ in., and inclined struts T.I. 2½ in. by 3 in. by ½ in. and 2 in. by 3 in. by ½ in. The vertical suspension rods are 1⅜ in., 1 in., and ⅞ in. in diameter. The roof is slated upon purlins 1½ in. by 1½ in. by ¼ in., L.I. placed 10 in. apart with eaves gutter of lead bedded in the stone coping. The ventilator measures 9 ft. 6 in. by 1 ft. 11 in. deep.

It will be seen by reference to figs. 31 and 35 that the vertical tie-rods are connected to the rafters by means of cotter joints, hence avoiding the introduction of coupling nuts. The struts and ties have independent bolt connexions, likewise the horizontal rods (see figs. 38 and 39). This method reduces the width of the connexion, but necessitates the use of packing pieces. In the roof over the retort house at Folkestone, described above, each tie-rod and strut is furnished with independent bolt connexion as shown in the detail at C., fig. 63. At Sittingbourne Station the struts are of flat bars, 4 ft. by ⅜ in., 3½ in. by $\frac{5}{16}$ in., and 3 in. by ¾ in., with cast-iron distance pieces to obviate buckling, and ½-in. bolts with washers, which are united by a bolt connexion to a U or channel-shaped coupling, forming a jaw into which the inclined tie-rods are screwed.

It is very necessary that the lengths of the various elements of a roof truss be accurate in order to ensure satisfactory results. Various means are adopted in different structures, such as coupling nuts with right and left-hand screws and cotter-joint connexions.

The roof over the purifying house of the Sheffield United Gas Light Company, designed by Mr. F. W. Stevenson, is 226 ft. in length by 91 ft. wide in two spans, slated upon laths 1½ in. by 1½ in. by ¼ in. The roofs are hipped at one end. The merit of the application of Type F is here seen to be advantageous. The ordinary rafters are formed of T.I. 3 in. by 4 in. by ½ in., with T.I. struts 3 in. by 3 in. by ½ in., with inclined tie-rods of 1¾ in. and 1⅜ in. diameter and horizontal logitudinal tie of 1¼ in. diameter at the centre of the lower tie to the principal. The span in the clear of each roof is 45 ft. 2 in., with rise of 11 ft. 3 in., the tie-rod being raised 18 in. above the springing line. The roof is surmounted by a ventilator of 9 ft. span having timber louvre boards 6 in. by 1 in., the drainage from the ridge being taken by vertical 2 in. R. W. pipes on to the roof slope.

An example of Type G is seen in the Retort House roof of the East Greenwich Works, South Metropolitan Gas Company, but in this case the tie is not curved and the truss at the springing is stiffened by the proximity of the first inclined member. The roof is supported by girders and the principals are placed 6 ft. 7½ in. apart. The span from centre to centre of girders is 72 ft. 5½ in., and the roof is surmounted with a ventilator 5 ft. 2 in. wide, 4 ft. 8 in. high, open at the top and ends. The rafter consists of two L.I. 6 in. by 3 in. by ½ in., with vertical members 1½ in., 1 in., 1 in., and ⅞ in. diameter, and inclined members 2 in., 1¾ in., and 1¼ in. diameter, with a slated slope, making 24 deg. with the horizontal. Its length is 427 ft.

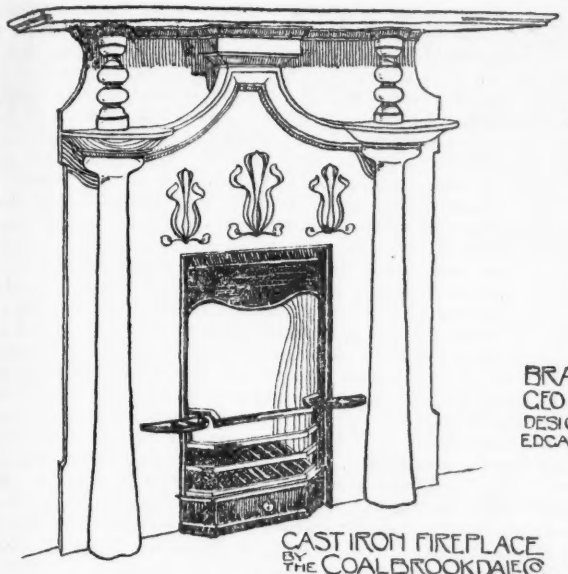
The roof over the Retort House at Beckton belonging to the Gas Light and Coke Company (see lithograph illustrations) consists of two widths of 120 ft., including a central span of 70 ft. and two side spans of 25 ft. each. It was designed by Mr. G. C. Trewby, to contain 132 settings of inclined retorts, each 15 ft. long. The ground or coke hole floor is at the level of Trinity high water, above which the stage for the storage of coal is raised 10 ft. The total height of the Retort House from the ground level to the apex of the roof is 66 ft. 6 in. There are eight lines of railway running through the house, four at the ground floor level and four on viaducts, 30 ft. 5 in. above the ground floor. Three lengths of water tank 371 ft. 6 in. are placed under the eaves of the roof, so as to collect the water from the roof. The side tanks are 7 ft. wide and the central double tank 14 ft. wide. The tanks are each 5 ft. 7½ in. deep. At every 28 ft. 6 in. there is a steel roof principal, 8 ft. 6 in. deep in the centre, with a curved lower member, giving 58 ft. clear headway above the coke floor. The straight inclined upper member of the truss, as well as the curved tie, each consist of steel channels 15¾ in. by 3 in. by $\frac{9}{16}$ in. There are two secondary rafters of 4⅝ in. by 3 in. by ⅜ in. H. steel, spaced 9 ft. 6 in. apart in each bay, supported upon cross girders of lattice-work 2 ft. deep throughout, having flanges of 6 in. by 4 in. by ½ T.S. The central roof is supported upon steel-plate stanchions, and the side inclined rafters form a continuation of the slope at each lower end of principal. These roofs cover 18 ft. out of the 25 ft. side spans, the tanks occupying the remainder. The slate purlins are of 3 in. by 3 in. by ⅜ in. L.I., spaced 10½ in. apart centre to centre, fastened to the main and intermediate rafter by angle cleats 3 in. by 3 in. by ⅜ in. The spandrel brackets which rest upon the stanchions have two ⅜ in. cheek plates rivetted with ¾ in. rivets, 4 in. pitch, thus forming a closed box support, which is filled with concrete to a depth of 8 ft. above the springing level, and the central portion of the main principal 58 ft. span is attached to the 6 ft. spandrels by two angle frames 3 in. by 3 in. by ½ in. An open ventilator 313 ft. 6 in. long, beginning and ending over a principal, runs throughout the roof, and it is 4 ft. wide with sides 2 ft. 6 in. high, made of $\frac{3}{16}$ in. plate, rivetted to vertical T.I. 3 in. by 3 in. by ½ in., 4 ft. 9 in. apart. The details of this roof as furnished by figures 1 to 21 show the construction, which was erected by the Horseley Iron Works of Tipton, under the superintendence of their representative, Mr. H. L. Batting.

Another interesting form of a roof with an arched lower member is given in the design for the new Retort House of the Hartlepool Gas and Water Company, made by Mr. T. Bower. The roof is 100 ft. clear span, 230 ft. long, and is to be arranged for inclined retorts, with overhead coal-storages, tanks, &c. There are ten main arches, with perforated web plates, the flanges being formed of angle iron and plate. The roof springs at a level of 21 ft. above the floor, and has a clear height of 61 ft. to the under side of the arch. The stage is only 3 ft. above the floor of the coal store. The straight inclined rafter consists of two L.S. 4 in. by 3 in. by ⅜ in., carrying duchess slates on 2 in. by 2 in. by ½ in. L.S. purlins, 10½ in. centres. Between the sloping rafter and the top of the arch member struts and ties of ½ in. bars are inserted with packing pieces and rivetted. The curves to the soffit of the arch are 36 ft. 3 in. radius from the springing to a distance of about 34 ft. upwards, and thence a curve of 62 ft. radius over the centre. The main principals are supported by brick piers 3 ft. 9 in. by 3 ft. 4½ in., built into walls 1 ft. 10½ in. The ventilator is simply an opening of about 5 ft. wide, carried over the ridge the whole length of the building. The main principals are 21 ft. 6 in. apart, with secondary rafters consisting of two L.S. 4 in. by 3 in. by ⅜ in., with trussing of 3 in. by ⅜ in. bars, dividing the bay into three divisions.

The roof over the Sunderland Railway Station (N.E.R.) is covered with a roof somewhat similar to the above, the principals being 95 ft. span, with a clear headway in the centre of 45 ft. 6 in. The ridge is here raised about 9 ft. 6 in. above the bottom flange of the arch at the crown to carry the rafters, which run down upon each side in a straight line to the gutters resting upon the side walls, which are raised at the abutments to receive them. The upper portion of this roof is glazed, and curved glazing is thus avoided. The outside lower portion is slated, while the interior view shows curved boarding carried over the main ribs.

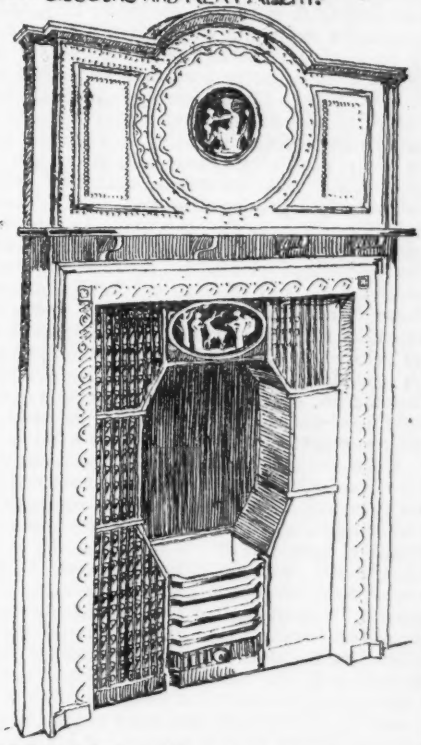
WESLEYAN CHURCH, CHESHUNT, HERTFORDSHIRE.—The memorial stone of a Wesleyan Church, in Crossbrook-street, Cheshunt, was laid on the 24th ult. The architect is Mr. John Wills, of Derby.

COPPER FREIZE BY EDGAR SIMPSON



CAST IRON FIREPLACE BY THE COALBROOKDALE CO DESIGNED BY SEGAR OWEN ARCHT

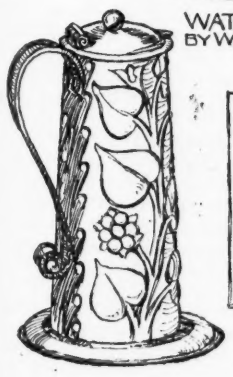
BRACKET BY CEO WRAGGE DESIGNED BY EDGAR WOOD ARCHT



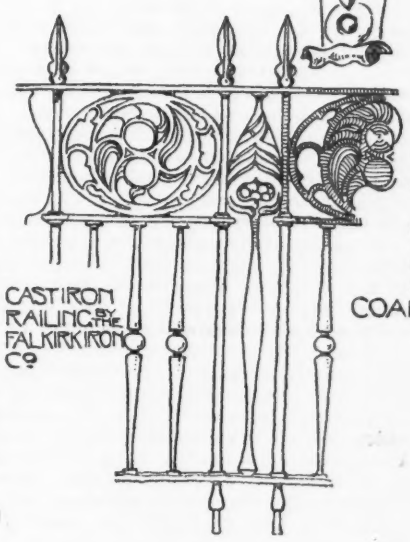
CAST IRON FIREPLACE AND GRATE DESIGNED BY WR LETHABY ARCHT

GRATE DESIGNED BY CC BREWER ARCHT BY THE COALBROOKDALE CO

LOVING CUP AND WATER JUG BY W.T. FLOWERS



BELL PUSH BY EDGAR SIMPSON



CAST IRON RAILING BY THE FALKIRK IRON CO

Sketches of Decorative Work in Metal.

SKETCHES OF DECORATIVE WORK IN METAL.

THIS sheet of sketches was originally made to illustrate the contents of the Art Metal Exhibition at Westminster two years ago, but owing to an accident they were not published at the time, along with the other illustrations of work at that exhibition.

They are, however, of quite sufficient interest in themselves, independently of the occasion for which they were originally intended.

BRADFIELD COLLEGE PLAY.—We may draw the attention of our readers to the Bradfield College Greek play, which will be given in the Greek Theatre at Bradfield College on the 19th, 21st, 23rd, 25th, and 26th of this month. The play is the "Agamemnon" of Æschylus, which has been given before by the college. Those of our readers who wish to attend, and who have not as yet made arrangements for doing so, should write to the Hon. Secretary for the Greek Play, Bradfield College, Berks.

ARCHITECTURAL SOCIETIES.

NORTHERN ARCHITECTURAL ASSOCIATION.—Fine weather favoured the members of the Northern Architectural Association on the occasion of their excursion to Jarrow and Tynemouth on the 9th inst. Assembling at Jarrow Station at half-past three, the party, headed by Canon Savage, proceeded to the old church. An ancient pair of stocks standing just within one of the entrances to the churchyard was first inspected. Entering the church, the company seated themselves in the chancel, where they were addressed by Canon Savage, who explained the chief features of the edifice. He said that what is now the chancel had originally been the church itself, the tower and other parts having from time to time been added. At the east end there had no doubt been a presbytery, but the foundations could not be traced. There they had a fair specimen of the ordinary Saxon church, forming a double cube—not exactly, but practically a double cube—with a presbytery behind. The presbytery arch set the pattern for the inner arch. At that time it was not the custom to build a large church, but rather to build a succession of churches in accordance with the requirements of the community. Thus, in the present instance, there had been first one church, and then another church had been built to the west. The evidence in support of this statement was a plan in the British Museum, a ground-plan of 1769, and an earlier description by Hutchinson. The great problem was, when was the tower added, and what purpose did it serve? It was analogous to that at Monkwearmouth, and whatever Monkwearmouth added its tower for, so did Jarrow. Both opened into a chamber above, and it was possible that precious relics were deposited there. The shape of the tower was conditioned by the adjacent building pressed upon it. The reverend gentleman referred to the windows, remarking that the first one, on the right-hand side of the chancel, was of peculiar interest. He afterwards directed attention to the very beautiful benches upon

which his auditors were seated in the chancel. Their date was furnished by Prior Thomas Castel's rebus; and it was evident that they had never been meant for Jarrow. The probability was that they came from the Jesus Altar at Durham. In 1069 the church was burnt by William the Conqueror when he ravaged the North from the Tees to the Tyne in revenge for the murder of Robert Comines. Bede was buried in a porticus on the north side; his grave might have been on the north side of the porticus still existing. The reverend Canon then produced a cast of the dedication stones of the church showing that it was dedicated in 684 in the fifteenth year of King Egfrid. In June of that year Egfrid was killed by the Scotch. Leaving the church the visitors inspected the ruins of the monastic buildings adjacent to it, and were shown a number of ancient stones discovered when the edifice was restored. These stones afford some of the most beautiful examples of Saxon carving to be found in the whole of England. Responding to a vote of thanks proposed by Mr. A. B. Plummer, Hon. Secretary, and seconded by Mr. W. Reay, Canon Savage advised his hearers to ascend the tower next time they visited the church, if only they might see the two pre-Reformation bells it contained. Their date was uncertain, but they were undoubtedly pre-Reformation, and were probably the bells referred to in the report of Edward the Sixth's commissioners. The party then proceeded by boat to Tynemouth pier, and thence to Prior's-terrace, where Mrs. Plummer entertained them to afternoon tea, after which the party went to the Priory and Castle buildings, where, under the guidance of Canon Hicks and Major Chamberlin, they were shown portions of the buildings not usually accessible to visitors. They saw first a ruin supposed to have been an annexe to the refectory, and remarkable for the ribbed vaulting of its roof, and afterwards the refectory itself, which is now a magazine. The remains of the Lighthouse are more interesting than might be supposed, as in its construction material from the Priory was freely used, the Priory, in fact, serving as a quarry. A good deal of curious masonry was recovered when the lighthouse was pulled down, and the stones are being carefully preserved by Major Chamberlin. Several of the architects endeavoured to break an old brick against a modern one, and even against stone; but the attempt was a failure. At the Abbey, Canon Hicks pointed out that it was very evident that the building once had a gabled roof, and those who had added to it had not even taken the trouble to remove the angles of the stone. The part above the gable might have been employed as a granary, and was probably of not much later date than the main body of the building. But it was different work and different stone. Within the Priory, Canon Hicks explained where the high altar had stood, and pointed out the piscina. Afterwards the Lady Chapel, supposed to have been founded by a member of the Percy family, was inspected.—*Newcastle Chronicle.*

ARCHÆOLOGICAL SOCIETIES.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—The concluding meeting of the session was held at 32, Sackville-street, Piccadilly, on the 6th inst., Mr. Thomas Blashill, Vice-President, in the chair. A rare collection of miniatures of historical interest was exhibited by Mr. B. Nathan, who gave particulars of many of them, including one of the unfortunate Marie Antoinette, which was set in a diamond frame. One of Lady William Russell and another of Lady Duff, both by Englehart; also a portrait of Lord Powerscourt, by Horace Hone, 1793, and a fine enamel of Lady Mills, by Petitot, attracted much attention. There were examples of the art of Samuel Cooper and Andrew Plymer amongst the collection. Mr. Nathan also submitted for inspection some richly-chased gold and enamelled presentation snuff and other boxes, one being to Lord Howe, commemorating the naval victory off Brest, in 1794; and a tortoiseshell silver-mounted box with painting in the lid, by Jean van Goyen, 1656. Mr. Essington Hughes also exhibited some fine miniatures of family interest. Mr. Andrew Oliver brought for exhibition a "Book of Hours," French, of the fifteenth century, richly embellished with illuminations and miniatures. Mr. Charles Lynam, F.S.A., hon. treasurer, gave a short address on the Island of Iona, and illustrated it with drawings by Mrs. Lynam and plans and sketches by himself, also by numerous photographs by Mr. Alfred Meigh. He briefly described the origin of the universal fame of this little western island of Scotland, a Christian mission station of the sixth century, founded and worked by St. Columba with results still abiding throughout Christendom. The fact that no vestige of the early buildings now remain was noted, but the suggestion that possibly the great earthworks to the west of the present cathedral were part of St. Columba's work was thrown out. The entire disconnexion of the origin of the present remains with that of the early establishment was emphasised and description given in detail of what now exists of the Cathedral, St. Oraw's Chapel, the Nunnery, and the two upright crosses of I. Maclean and St. Martin, all of which were fully illustrated.

LONDON AND MIDDLESEX ARCHÆOLOGICAL SOCIETY.—An excursion of this Society was made on the 30th ult. to Perivale, Harrow, and Northolt, Middlesex, under the presidency of Mr. E. W. Brabrook, C.B., and the direction of Mr. T. W. Shore. About fifty ladies and members assembled at Ealing at 3 p.m., where carriages were waiting, and they were driven first to Perivale, where its very interesting church was inspected. The next drive was to Harrow, where the visitors were received in the church by the Rev. W. D. Bushell, who described the building. He said he relied for his facts on Mr. Gardner's book on Harrow Church, on an illustrated article which appeared in the *Builder*, January 26, 1895, and other authorities. In considering the history of this church they had to remember four churches in succession, the Norman church, the Early English, the Early English with some considerable Perpendicular and Decorated additions, and fourthly, the present restored church; or, in other words, the churches of the twelfth, thirteenth, fifteenth, and the nineteenth centuries. The original Norman church was built by Lanfranc after he became Archbishop of Canterbury in 1070. It was consecrated by his successor, S. Anselm, in 1094. There was still a Norman doorway to be seen (not by Lanfranc), but of a date about 1140, at the western end. There was also the font, which was placed there about 1170; it was made of Purbeck marble and had its own history; for, after being there over 600 years, it was ejected from the church and placed in the adjoining vicarage garden, but was recovered, thanks to Mr. William Winckley, and in 1846 it was restored and placed where they now saw it. In the interior of the church the older portions were Early English, with considerable Perpendicular additions. The lancet windows remained buried in the walls and were only unearthed five years ago. They had upon them the original colouring. In the parvise was a very interesting little niche of the fifteenth century. This church was restored by Sir G. G. Scott in 1849. It was very rich in brasses, to which he drew the attention of the members.—After partaking of tea, the drive was continued to Northolt, where the ancient and interesting objects in the church were also inspected, and a return to Ealing brought the meeting to a conclusion.

BRISTOL AND GLOUCESTERSHIRE ARCHÆOLOGICAL SOCIETY.—The spring meeting of the Bristol and Gloucestershire Archæological Society was held on the 7th inst., when excursions were made to Toddington, Hayles Abbey, Stanton, and Stanway. Members travelled either to Cheltenham or to Ashchurch, and thence in brakes to the rendezvous at Toddington. The historical and architectural notes on the places visited were prepared by the general secretary, the Rev. W. Bazeley, of Gloucester. At Toddington the company first inspected the ruins of the old house which was built at the close of the seventeenth century by the fourth Viscount Tracy, and which up to a time within the memory of persons still living has stood intact near the western end of the present church. All that remains of it now, overgrown with ivy, weather-scarred, and crumbling, but still erect, are a gateway that led into the yard of the house, with a one-storied lodge on each side, and two stories of a corner of the main building. The gateway, as was explained by Mr. H. A. Prothero, of Cheltenham, is a fine example of the period, with refined decorations in low relief, the frieze having a very rich vine pattern. The stout oak doors still stand, of fine design, with round-headed panels, worked with egg and dart ornament. The Rev. W. Bazeley described the features of the relics and what was known of the circumstances of the erection of the house. For 850 years Toddington had belonged to the Tracys and their progenitors, the De Sudeleys. Like most of their contemporaries, they shared in the spoil at the dissolution of the monasteries. The next place visited was Lord Sudeley's beautiful Gothic mansion, Toddington House, where the object of chief interest was the stained-glass window which is in the cloisters. Mr. St. Clair Baddeley read some notes that he had prepared on the glass for the information of the members. The company then drove on to the interesting little church of Hayles. Only a brief visit was paid, however, by most of the party to this quaint, tiny relic of early architecture. After lunch a visit was paid to the Cistercian Abbey of Hayles, of which the Rev. W. Bazeley and Mr. St. Clair Baddeley gave descriptions to the visitors. It was founded in 1246 by Richard Earl of Cornwall, and dedicated on November 5, 1251. A short drive brought the visitors to Stanton, where they were welcomed in the parish church by the rector, the Rev. M. B. H. Burland. The Rev. W. Bazeley described the church, which consists of a nave with south porch, north and south aisles, and north and south transeptal chapels, chancel and western tower, and related its architectural history. In the twelfth century the monks of Winchcombe built a Romanesque church on the site of an earlier Saxon edifice. The Norman church had a nave with one aisle on the north, and a chancel. There are no traces of a Norman south aisle. On the return journey a call was made at Stanway House. Here the gatehouse attracted particular attention—a stately building, attributed to Inigo Jones. The Church of St. Peter was also visited. The company left Stanway about half-past five, and those returning to Bristol reached Temple Meads soon after 9 o'clock.—*Bristol Times and Mirror.*

ESSEX ARCHÆOLOGICAL SOCIETY.—A quarterly excursion of the Essex Archæological Society took place on the 9th inst. The meet was at Wickford railway station, and the party was under the guidance of Mr. G. F. Beaumont, the hon. secretary. A few minutes' drive brought the party to Nevendon, where the church was visited. A few notes on the building were read by Mr. Beaumont. It is of small dimensions, consisting of nave and chancel without aisles, and is of very early erection. The chancel is Early English—as early as the reign of Richard I., but alterations and insertions have been made at subsequent periods. From Nevendon the party journeyed on to South Benfleet, where they were provided with refreshments by the Vicar in the parish-room. A short meeting was held there under the presidency of Dr. Laver, and several new members were elected, after which the chairman read a paper on "The Benfleet camp." Benfleet, he said, was one of the historical places of the kingdom, and of considerable interest to those who paid the least attention to how England was made. The first mention of it was in the "Saxon Chronicles," about the year 894, a Danish camp or fort being erected. After this, the church, a large edifice, was inspected. The late Secretary of the Society (Mr. H. W. King) considered it one of the finest specimens of ecclesiastical architecture in the country. It was erected principally in the first half of the fifteenth century, and in the tower there are remains of Norman work. The south porch is one of the finest timber porches in the kingdom, the interior having richly-carved spandrels and embattled beams, while the gable and sides are filled with mullioned tracery. Fifty years ago it was in a dilapidated state, but it had since been judiciously restored. On this point Dr. Laver remarked that the restoration of the porch was performed by a local wheelwright, who had no idea on the subject of ecclesiastical architecture, and that was why the work was well done. A description of the interior of the edifice was read by Mr. Beaumont, who drew particular attention to the magnificent and spacious arch by which the nave opens into the chancel—the arch itself being of the Perpendicular period. The tower retains remains of its former foundation. The Vicar added some explanations regarding the church, and detailed what work of restoration had been carried out, and what remained to be done, and also read some very quaint entries from the old church registers. Some of the party subsequently

visited the eminence overlooking the station, where the Danish camp is supposed to have been situated, and then a move was made for Thundersley. Thundersley Church was inspected, and its principal features pointed out by Mr. Beaumont, after which the party drove to Rayleigh.—*East Anglian Times.*

Books.

Denderch: 1898. By W. FLINDERS PETRIE. Seventeenth Memoir of the Egypt Exploration Fund. Kegan Paul, Trench, Trübner & Co.

AS Professor Petrie remarks in his preface, Dendereh (which is the spelling now approved) is to most persons only a temple, one of the most popular and best preserved remains of Egyptian architecture, visited by every tourist, and fully described and illustrated by Mariette. "But beside the temple there was a town, which is yet untouched, except by native diggers." A cemetery of a capital, unopened in modern times, was a promising site for historical study. This volume contains the description and illustrations of the result of the explorations of Mr. Petrie and his party. Separate chapters are contributed by Mr. Griffith, Dr. Gladstone, and Mr. Oldfield Thomas.

The first two chapters give a general description of the character of the tombs opened and the objects found in them, distinguishing between the dated and undated examples. In relation to the tomb called "Merra," the most important of the second or undated group, we have the description of a piece of dome-building which, on a small scale, seems to resemble a Jaina dome; "the doming was made by placing a brick across the corner, then two over that with a rise in the middle; four over that again, and thus gradually bringing forward the corners so that a ring of bricks could run round the well. The section of the dome showed the bricks slightly slanting inward, but mainly standing by resting on those below." Professor Petrie says this is the oldest dome known, which if correct gives it a special interest; but somehow we fancy the "oldest dome known" seems to crop up from time to time in different localities.

Mr. Griffith's chapter on the inscriptions indicates how much of suggestive interest there is in them, all the more in many cases from their fragmentary condition. The following is the translation of one of them, with Mr. Griffith's suggestions as to the filling up of the lost portions :—

"The fragments of biographical inscriptions on this plate are very tantalising. '. . . . which my father, who loved his house, [built?] for me; I found it as enclosures of bricks, I [renewed it with stones? I supported?] it with standing posts of wood of every sort; of eleven (cubits) in height, furnished with doors of *u*[*an*-wood?] . . . . gardeners (determined by a man carrying pots of water by means of a yoke) were making vegetables (compare the picture in *El Bersheh*, I., pl. xxvi., *B. H.*, I., pl. xxix., right), pond-keepers were planting trees, the little man was owner of his bow (or yoke), every man was owner of his own work: I did this throughout, throughout in very truth. This is not as said . . . . my father, Merra.' It seems as if this belonged to Merra, son of Sen'nezsu."

One would like to know what was the exact feeling and meaning underlying this inscription on a stele on the tomb of Ptah-mera :—

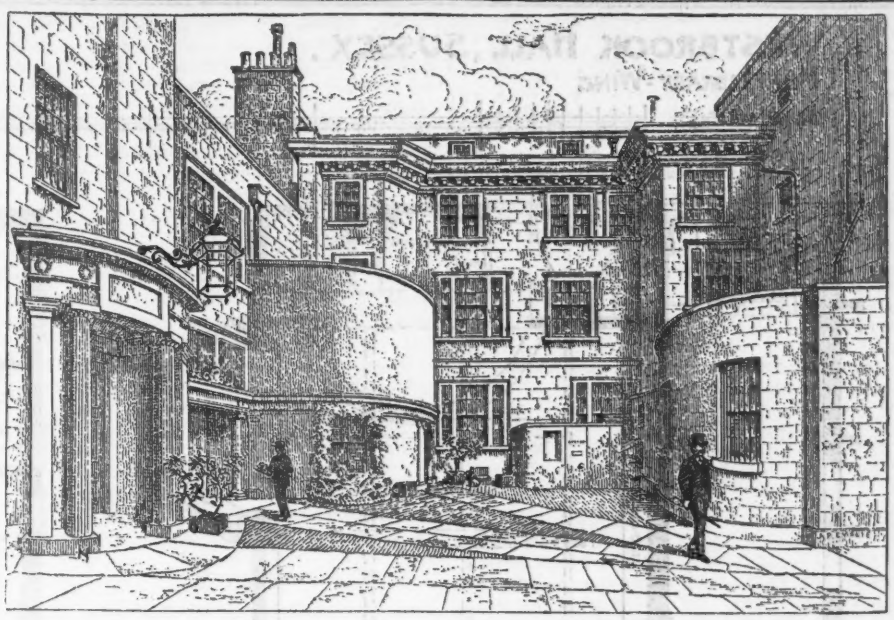
"I came forth from my house, I entered my chamber; I said what the great loved, what the little praised."

The illustration plates to the volume are numerous, showing many carvings, a complete "false door" to one of the tombs, outline drawings of pottery and mirrors, photographs of statuettes, bronze vessels, and amulets, a plan of the site showing the positions of the tombs, and separate plans of a number of them to a larger scale. A chromolithograph view of the arched passage to the tomb of Adu I. forms a frontispiece to the volume.

The Annual of the British School at Athens. No. V. Session 1898-9. Macmillan & Co.

THIS issue of the Annual of the British School at Athens contains an account of the excavations in Melos during 1899. The structures are described by Mr. T. D. Atkinson, who also gives a measured plan of the portion of the remains of the city of Phylakopi which has been unearthed. The remains, of course, tell one little else than the plan of the buildings, the walls of the most interesting building discovered remaining for only about a foot above ground. Mr. Edgar gives a chapter on the pottery. Mr. C. D. Edmonds contributes a chapter on some doubtful points of Thessalian topography, the object of which is to attribute their right names to some ancient sites which lie close to the Peneios in its course from Trikkala to Larissa. After this follows the account of the latest excavations at Naukratis, which occupies the larger portion of the volume; excavations undertaken partly in consequence of the opinion expressed by Mr. Ernest Gardner, in summing up in 1889 the results of Mr. Petrie's excavations begun in 1884, that there was something more to be done at Naukratis. The discoveries hardly seem to have been proportionate to the amount of labour spent in attaining them. At the conclusion of the account of them, however, is a memorandum to the effect that the Arab village which lies very close to the north of the mound certainly covers the site of a cemetery, and that any one who will find the money to expropriate this village will in all probability discover beneath it tombs from the sixth century onwards and a treasure of broken vases and terra-cottas. Mr. Edgar, as at Phylakopi, describes the pottery, and thinks that Professor Petrie has exaggerated the Greek element at Naukratis in the seventh century. He says, "Among the scores of antiquities that were dug up daily all over the south end of the site during our stay, we did not obtain a single fragment of early Greek work. Almost everything was Egyptian; there were Egyptian relics of the twenty-sixth dynasty, but not a scrap of early Greek pottery was to be found south of the temple of Aphrodite."

Mr. Gutch, in speaking of the terra-cottas, raises the question to what extent moulds were used in the production of figures, and gives some reasons for thinking that they were largely used. Comparing the Naukratis terra-cottas with the Tanagra figures, he suggests that moulds were used for the latter, but that the hair was subsequently treated with a tool. The remarkable similarity in the design of the drapery and in the pose of many of the Tanagra figures in the British Museum certainly suggests the use of moulds for multiplying the designs, though the drapery, we may suggest, as well as the hair, of each may have been subsequently modified with a tool.



Winchester House: from the "Illustrated Topographical Record of London."

Illustrated Topographical Record of London. First, Second, and Third Series. London Topographical Society.

THESE three thin quarto volumes represent the work so far done by the London Topographical Society in preserving illustrations of London buildings or sites which have been destroyed or altered. The first series deals with changes and demolitions from 1880 to 1887; the second series is labelled "1888-1887"; the third, 1888-1890.

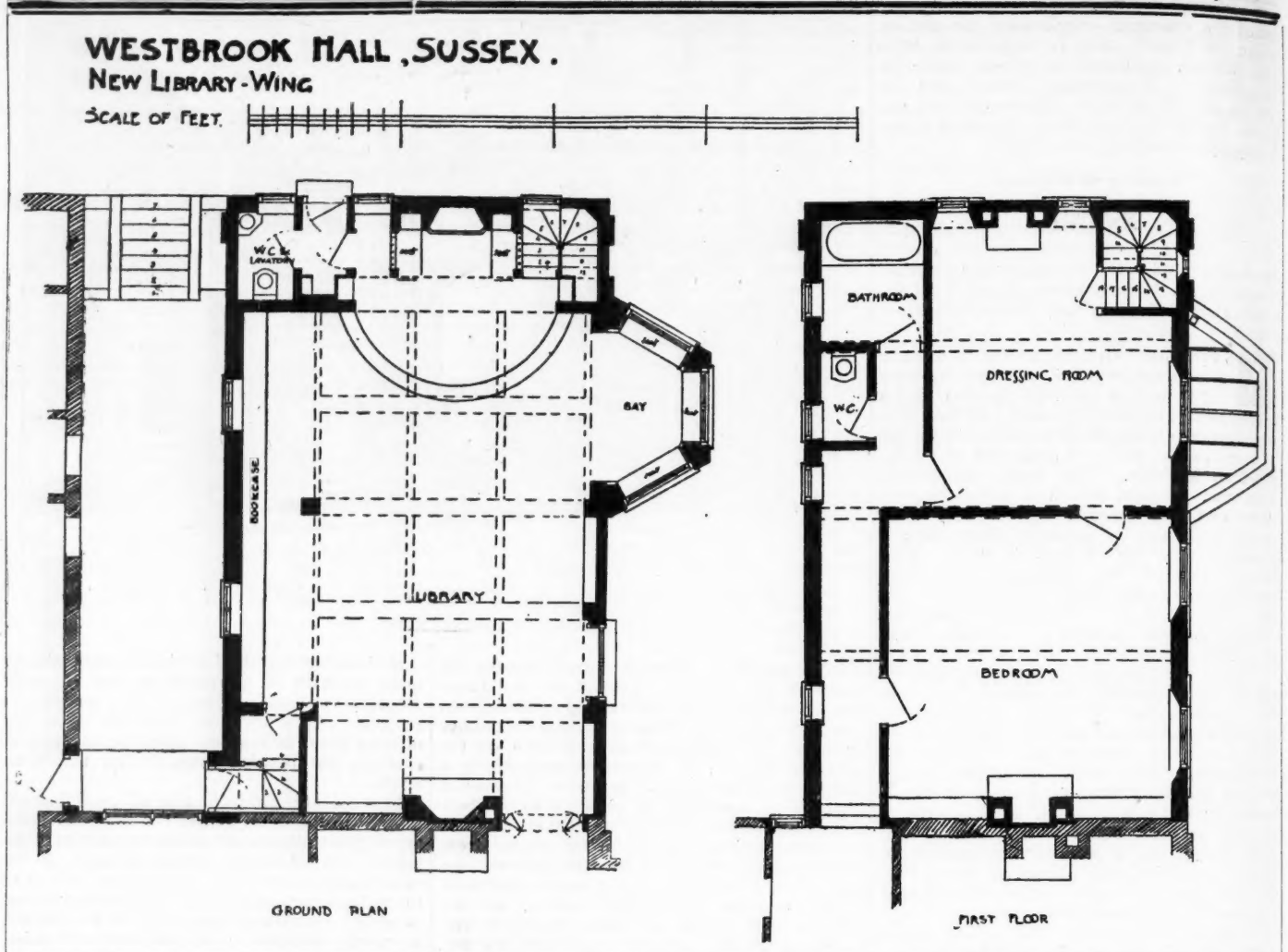
The illustrations in all the series consist of line drawings by Mr. J. P. Emslie, not always quite faultless in perspective, but in other respects very well suited to their purpose as records. Accuracy has evidently been the object; the drawings are shaded in line to give realism, but nothing is sacrificed to artistic effect.

Few of the subjects are of architectural interest in the usual sense, but many of them are of great interest in another sense, as illustrating the character and appearance of old streets and courts now demolished. Some of them, however, such as the sketches of "Some Nooks of Old Westminster" in the first series, are very picturesque; the park wall and some of the old trees of the manor of Earl's Court remind one pleasantly of the origin of a name now chiefly associated with a railway junction and clap-trap exhibitions; and a street in "Old Hampstead" shows what once stood where Fitzjohn's-avenue now is. A view of Regent's Circus, with the hoarding showing the line of the houses now pulled down, is significant in an architectural sense, as showing how the design of the Circus, as a circus, has been destroyed. These are all in the first series. Among the illustrations in the second is Savoy-court, near where the Savoy Theatre now stands, and the house in Fetter-lane where Dryden once lived, and which was pulled down in 1887. There is also the Marshalsea Prison (immortalised in *Rejected Addresses*) and some views of old Islington. In the third series, among other things, are several illustrations of the exterior and interior of the fine old house which once formed No. 23, Great Winchester-street.

The first series contains the only illustrations which are of architectural interest in the more special sense of the word; Winchester House, Old Broad-street, and the elaborate ceiling of one of its first-floor rooms, and the exterior view of Wren's east end of St. Matthew's, Friday-street—not very beautiful in itself, but interesting as the work of Wren, and as an unusual treatment of an east end, showing five circular-headed windows with narrow pilasters between them, extending right across the chancel. We give a reduced copy of the view of Winchester House and the courtyard in which it stood.

Good Citizenship: a Book of twenty-three Essays by various Authors, on Social, Personal, and Economic Problems and Obligations. Edited by the Rev. J. E. HAND, with a Preface by the Rev. CHARLES GORE, M.A., D.D. London: George Allen. 1899.

THE book contains a number of interesting essays on a number of important subjects—so important, indeed, that full justice cannot be done to them in the comparatively short space allotted to each. One subject, "Of the Municipality," we discussed partially not many weeks ago. Mr. Gomme, to whom the writing of this essay has been allotted, deals with the question of the extending functions of the municipality with knowledge and good judgment, but he has to do this in less than twenty pages. With one practical point we cordially agree, namely, that



when a municipality has undertaken any particular branch of business, such as the management of the tramways of a town, the results should be made known to all the ratepayers. As Mr. Gomme points out, every penny received after expenses are paid is in the nature not of profit, but of taxation—"it is taxing the tramway travellers for the relief of the general ratepayer." As municipal trading grows it is quite possible that what are regarded as ordinary rates may be considerably relieved by money which now goes into the pocket of private persons finding its way into the general funds of a municipality and so relieving the rates.

But as we are endeavouring to show the kind of book this is, it is impossible to dwell at length on one particular essay. The last in the book deals with Art and the Commonwealth. We wish that the well-meaning essay would tend to the beautifying of our cities. We confess it gives us very little comfort. "Civilisation need not spell ugliness," but that it too often does is obvious to anyone who goes about the world with his eyes open. "Workmen who are themselves artists" become more and more difficult to find in an age of machinery, where the corporations of workmen seem to desire to make every man work on a dead level, and where individual labour taken does not bring in more remuneration than more ordinary work. The artist workman is one of the remedies to which the author of the essay in question looks forward. But an age when there will be more beauty in our towns will only arrive by a combination of circumstances. There needs great public spirit and a determination to trust those who can produce beautiful buildings or good designs, without too great a regard to the cost. In other words, it should be accepted that what is built or produced for use should not only be practical but beautiful. Unfortunately, there is no denying the fact that, as a nation, we are not lovers of beauty—in other words, we have not taste. Being also a democratic nation, we cannot leave the matter in the hands of a few highly-educated and cultivated autocrats, as is the case in Germany. Careful teaching of the principles of art in elementary schools is probably the soundest basis on which to work for the future. But a feeling for and appreciation of what is beautiful will be useless unless there is also sufficient civic and national pride to enable a community or the nation to feel that it is for its reputation to have its towns or the capital beautiful. Other essays which may be of interest to our readers are those "On Capital," "Of Labour," "The Housing of the Poor," and "The Labourer and Workshops." As we have said, the shortness of the space devoted to each subject prevents the writer from dealing with them in a thorough manner. But the book is suggestive, and will, we hope, quicken the interest of those in various forms of civil life who are at present neglectful of their duties as English citizens.

An Evening with Punch. Being a selection from the first fifty years of *Punch*. London: Bradbury & Agnew. 1900.

THIS selection of specimens of the illustrations of *Punch* during fifty years has been made in a spirit of catholicity and with excellent judgment. We meet with some well-remembered and some forgotten examples of the work of Thackeray, Leech, Doyle, Keene, Du Maurier, among the deceased worthies, and Sir John Tenniel, Mr. Linley Sambourne, and others among the living. The collection includes three of the most serious in intent of all the long succession of cartoons—Keene's "The Shadow on the Hills," and Sir J. Tenniel's "Dropping the Pilot" and "A Lesson." Among the minor drawings we find Keene's delightful "Zoology," in which the travelling status of the tortoise is settled by the railway porter; Leech's scene, "Did you want to buy a good razor, sir?" various humorous sketches by Thackeray (of rather unequal merit, but interesting as his work); Du Maurier's idyll of "The Six-Mark Teapot," and his splendid nightmare cab-horse, in which there is something quite Rabelaisian; Doyle's series of Brown, Jones, and Robinson at the riding school; and Mr. Furniss's "Getting Gladstone's Collar up." Sir John Tenniel's never-to-be-forgotten cartoon, too, "Mosé in Egitto," which sent a thrill of laughter over England, is one of the best things in the volume. The variation in the artistic character and method of the work of different periods is a point of interest, as well as the changes in costume and occupations which are recorded. Hablot Browne's drawing of "The Lawyer," powerful in a way, represents a school of malignant caricature—artistically ugly, too—which one is glad to have lost sight of in the distance; but it was as well to give a specimen of it. The only illustration we could have well spared is that of one of the set of heads called "Puzzle-Headed People," an unhappy invention of Mr. Furniss. There was no real humour in these, and they might well have been forgotten.

BOOKS RECEIVED.

THE CHEMISTRY OF FIRE AND FIRE PREVENTION. By Herbert Ingle and Harry Ingle. (E. & F. N. Spon.)

ELEMENTARY PRINCIPLES OF ELECTRIC LIGHTING. By A. A. Campbell Swinton. (Crosby Lockwood & Son.)

Illustrations.

THE MOOT HALL, COLCHESTER.

THE Moot Hall is immediately under the main roof of the new Town Hall at Colchester; the stanchions supporting the principals occurring where the coupled columns are shown. The extra depth required for the principals themselves is obtained by breaking out the frieze round these columns and forming the ribs shown in the ceiling.

In addition to the three large windows in the façade, which will be filled with stained glass commemorative of the history of Colchester, the hall will be lit by large roof lights in each bay to admit of picture exhibitions being held there.

The walls and ceiling will be finished in plaster, and the panels and recesses painted with historical and other subjects.

At the west end is a deep recess for the organ immediately over the stage.

The floor will be in parquetry and the panelling in oak.

The architect is Mr. John Belcher, A.R.A.

LIBRARY, WESTBROOK HALL.

THE library occupies the ground floor of a wing which has recently been added to an older house. The style and dimensions of the existing building have, of course, largely governed the design of the new work, the exterior being of plain Italian character with rough-cast walls and cement and stone dressings. The inside of the room is rather elaborately finished with oak joinery and

marble mantel-pieces. The bookcases are being made plain at present, but will ultimately be carved. The builders are Messrs. Holden, of Cranleigh, and the carving in the ingle nook has been carried out by Mr. Read, of Exeter. The fresco over the ingle nook arch is at present "in nubibus."

CHARLES A. NICHOLSON.

SECTIONS AND DETAILS OF IRON ROOFS.

THE two sheets of constructional details of roofs over three retort houses are given as illustrations to the paper by Mr. A. T. Walmisley published in the present issue.

Retort house roofs are not, as such, of any special interest more than other iron roofs, but Mr. Walmisley's paper and illustrations, which he has kindly placed at our service, gave the opportunity of illustrating some constructional details of recent iron roofs The engineers who designed the roofs are Messrs. Hawksley & Sons, for one of them, and Mr. G. C. Trewby for the two others.

BUILDING TRADES' GIFT TO THE NATION:

HOMES FOR DISABLED SOLDIERS.

WE have pleasure in announcing the following further list of subscriptions :—

	£	s.	d.
Kidderminster Association of Employees in the Building Trades (per Mr. Jas. Jones)	11	0	0
Workmen of Messrs. Shanks & Co., Ltd. (Barrhead, Glasgow)	9	17	0
Collected on cards by Mrs. Laura Haggas (Yorks)	5	4	6
Mr. John Stewart (Peckham)	5	0	0
Mr. J. H. Haggas (Yorks)	5	0	0
Mr. J. Sugden (Yorks) (per Mrs. Laura Haggas)	5	0	0
Messrs. W. J. Mitchell & Son and Employees	2	11	0
The Civil Workmen in the Royal Engineers' Office (Shorncliffe) (per Mr. W. Leach)	2	9	2
Workmen of Messrs. Val De Travers Asphalte Paving Co.	1	13	8
Workmen of Messrs. T. Rider & Son (per Mr. Chas. Parfitt)	1	8	0
Workmen of Messrs. Barnes & Co. (Shoreditch)	1	6	7
Mr. F. D. Moore (Yorks) (per Mrs. Laura Haggas)	1	1	0
Mrs. F. D. Moore (Yorks) (per Mrs. Laura Haggas)	1	1	0
Mrs. Laura Haggas	1	0	0
Mrs. Sugden (Yorks) (per Mrs. Laura Haggas)	1	0	0
Miss Sugden (Yorks) (per Mrs. Laura Haggas)	1	0	0
Employees of Mr. William Smith, jun. (Wolverhampton) (per Mr. W. Vincent Vale)	1	0	0
Miss Cockshott (Yorks) (per Mrs. Laura Haggas)	0	10	0
Mrs. Holdsworth (Bradford) (per Mrs. Laura Haggas)	0	10	0

COMPETITIONS.

OLD BAILEY SESSIONS HOUSE.—At a meeting of the Court of Common Council of the City of London on Thursday Mr. Pryke, Chief Commoner, introduced the report of the City Lands Committee dealing with the competition for designs for the new Sessions House in the Old Bailey, and moved that the recommendation in favour of the adoption of designs No. 4 be adopted. This was agreed to, and the Town Clerk then opened the sealed envelope containing the name of the author of the design. This proved to be Mr. Edward W. Mountford. The other competitors were :—No. 1, Mr. H. T. Hare ; No. 2, Mr. H. L. Florence ; No. 3, Mr. J. M. Brydon ; No. 5, Mr. Frank Baggallay ; No. 6, Mr. John Belcher.

HOSPITAL, VENTNOR, ISLE OF WIGHT.—In the competition for the Undercliff Isolation Hospital, Ventnor, Isle of Wight, the first premiated design is by Mr. George Boughton, Caen Cottage, St. John's Park, Ryde, I.W. ; and the second by Mr. Edward L. Gaunt, 1, Wyndham-place, Bryanston-square, London, W.

GENERAL HOSPITAL, GLASGOW.—The first premiated design (200*l.*) in this competition is that by Messrs. Schultz & Howard, 14, Gray's Inn-Square, London ; the second (150*l.*), Messrs. Thomson & Sandilands, 241, West George-street, Glasgow ; the third (100*l.*) by Messrs. Hopkins & Walker, 5, Staple Inn, Holborn, London ; and the fourth (50*l.*) by Messrs. McWhannell & Rogerson, 58, West Regent-street, Glasgow. We are informed, and we regret to hear it if true, that the committee have thrown over the first premiated architects, and intend to carry out the second premiated design, which is by a Glasgow firm.

MUNICIPAL TECHNICAL INSTITUTE, &C., EASTBOURNE.—In accordance with the recommendations of Professor T. Roger Smith, the assessor, the Eastbourne Technical Instruction Committee have awarded the premiums in the competition for a Municipal Technical Institute, Public Library, fire station, &c., on the site at the corner of Grove-road and Water-lane. There were twenty-one designs sent in, and the premiums have been awarded to the following :—(1) Mr. Phillip A. Robson, A.R.I.B.A., Palace Chambers, Westminster ; (2), Mr. Henry A. Cheers, architect, Twickenham ; (3) Mr. H. Drury, architect and surveyor, 2, Old Queen-street, Westminster, and Mr. W. C. F. Gillam, architect and surveyor, Central Chambers, 3, North-street Quadrant, Brighton, joint competitors.

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, on Monday evening, Mr. Henry O'Connor, President, in the chair, a paper was read on "Electric Traction" by Mr. Algernon Hamo Binyon. The author first compared the London traffic with that of New York, and gave figures of its distribution by various channels. He stated that the underground railways in London took only 19 per cent. of the total traffic against 81 per cent. conveyed by omnibuses and tramways—horse and cable. He showed that the whole population of London of 5⅓ millions travelled 124 times over in a year against the New York population of 3½ millions which travelled 210 times over yearly. He favoured the overhead trolley system, as used in nearly all English towns, as being the most efficient and economical, and he advocated the side trolley system, which obviates the unsightliness of very long brackets. The author expressed the opinion that the London United and the London County Council tramways would in time force railway companies to adopt electric traction, even for suburban traffic within a radius of from ten to twenty-five miles round London, that being probably the range within which competition would be strongly felt, and beyond which he stated that a steam locomotive would beat its electric rival. In combining lighting and tramway plant, Mr. Binyon advocated completely separate dynamos and mains. He described the double current generators which would take the load on the alternating or direct current as the demand was far from or near to the station. Engines were treated of from the large direct coupled units standpoint, and the author favoured slow speed Corliss engines. The power consumption of cars weighing about 12 tons with speeds of from six to twelve miles, and with stops of from eight to ten seconds, was given by the author in a table. The use of meters in cars was recommended for the reason that from 30 to 40 per cent. in power of the waste caused by the careless handling of controllers could be saved.

Correspondence.

To the Editor of THE BUILDER.

EXTRAS AND OMISSIONS IN BUILDING CONTRACTS.

SIR,—The paper read by Mr. E. H. Blake at the Surveyors' Institution is of the utmost importance to architects ; and I have carefully read your report of it. It gives valuable information respecting the question as to whether quantities shall be made part of the contract.

With the view that they should I quite agree, as being fairer to all parties concerned. There seems to me, however, to be this objection to this procedure, which has not been dealt with or discussed, and I should be glad to have authority on the point. I understand that when quantities are part of the contract the builder can dispute the amounts of those quantities. Naturally, if there is any difference between work carried out and quantities, the builder will only raise that question when the difference is to his loss, though possibly a larger difference may cut the other way ; but it seems to be nobody's business to prove it. This however, should not occur in accurate quantities to any extent. It is, however, almost impossible in a large job for there not to be a slight variation, say, a few feet of joists or rafters, or a small portion of brickwork. The builder may dispute the amount of quantities, which necessitates remeasuring to prove ; this may be done, and on completion only a few feet difference may be the result, but still just enough for the builder to argue his point that the quantities were not correct. In such a case I should like to know who would be responsible for the surveyors' fees.

Another point which I think wants dealing with much more thoroughly is the much-abused p.c. amounts. Many architects, I know, use the clause that p.c. amounts are exclusive of trade discounts, but never enforce it. This is unfair, as one builder may have lost the work through conscientiously noting this clause, while the other gets it through risking it not being dealt with. Again, some discounts are so enormous that clients are paying 25 and 30 per cent. into the builders' pockets for what they do not get. Take grates and mantels, for instance, at 500*l.* per cent., subject to 20 per cent. (the usual discount), 100*l.* goes to the builder for the privilege of paying for them, if he gets paid in his quantities for fixing. I mention this as I always enforce it, and find it many times causes great unpleasantness, the builders often coming in and saying to me that Mr. So-and-So has the same clause, but never enforces it. Of course right is right, and I do not allow it to be disputed ; but if architects would only carry out their duties to their clients in this respect they would save a great deal of unpleasantness to those who do, and assist in checking the deplorable pitch which the secret discounts are getting to.

ASSOCIATE.

The Student's Column.

DETAILS OF STRUCTURAL IRON AND STEEL.

23.—THE STRENGTH OF BEAMS.

STRESS resulting from bending moment constitutes the chief factor in problems relative to the practical strength of beams. The essential nature of a beam is such that some amount of bending stress must always be present, for even in the absence of any other weight, the material of the beam itself is really a load. Theoretically, there is no maximum limit to the amount of bending moment, but practically the maximum is attained when the breaking point of the beam is reached. The value of M, the bending moment for any given beam may represent the effect under any of the following conditions : (1) under an ascertained working load ; (2) under an estimated load ; (3) under a load sufficient to break the beam. Bending moment, regarded as the resultant of downward forces, is opposed by the resultant of upward forces in the beam, and known as the *moment of resistance*. This we will denote by the symbol R. Then in every case and under all circumstances $M = R$. It must be clearly understood that R does not necessarily represent the ultimate resistance of a beam, though this would be its maximum. As the moment of resistance always balances the bending moment, R equals the degree of resistance called into play in any specific case. Speaking in general terms, it may be said that M = weight multiplied by longitudinal measurement, and R = strength multiplied by breadth and depth. Expressing these statements in algebraic form, we have $M = Wl^x$, where l^x is the whole or part of the length of the beam, and $R = F I \div h$. But M is equal to R, consequently $M = F I \div h$. Hence $F = M h \div I$. In the latter equations F stands for the ultimate tensile or compressive strength of the material, I for the moment of inertia, and h for the distance of the extreme fibres from the neutral axis. The load W is not always sufficient to occasion the bending moment which would break a beam, and in such a case R would not represent the ultimate resistance of the beam. Therefore the fibre-stress could not be equal to F, which is the ultimate strength, and we must use the symbol f to represent the prevailing intensity of fibre-stress. Of course, it may be that the actual stress will be such that $f = F_t$ or F_c, and, although this condition is never intentionally caused in structural work, it is frequently assumed for the purpose of calculation. With the object of avoiding unnecessary complications, we shall use the symbol f to indicate fibre-stress under all conditions, and the above-mentioned expressions can be written in the following terms :—

Bending moment, $M = Wl^x$.

Moment of resistance, $R = p\,I \div h$.

Unit stress on the extreme fibres, $p = Mh \div I$.

Precise expressions for M under different conditions were stated in a previous chapter.

We are now furnished with equations by the aid of which the strength of a beam under any system of loading, and the intensity of fibre-stress at any distance h from the neutral axis should be calculable, providing the values of M and I be known.

The word "should" in the last sentence is used advisedly, because some beams, chiefly those of solid rectangular section, behave in an unreasonable manner when exposed to transverse stress. Hence the hypothetical stress f was invented by the late Professor Rankine, and was called by him the *modulus of transverse rupture*. This quantity is represented thus :—$f = M_r h \div I$, where M_r is the amount of bending moment which is sufficient to rupture the beam. Reference to the modulus f was made in Chapter 6, in connexion with the strength of cast iron, and we now append in Table XLIX. some values for beams of different kinds.

Table XLIX. Values of the Modulus of Transverse Rupture for Beams of different kinds.

	Values of f in tons.
Cast Iron.	
Rectangular bars (not exceeding 1 in. wide)	20·4
Rectangular bars (3 in. wide) ...	13·5
Round bars (1 in. diameter)	23·0
„ „ (2 in. „	20·0
I-beams (according to section) from) to ... ...)	7·5 15·0
Wrought Iron.	
Rectangular bars	23·0
I-beams	27·0
T-bars, with flange at top	24·0
„ „ „ at bottom ...	23·0
Steel.	
Rectangular bars	36·0

In calculating the strength of solid rectangular beams the expression $R = p\,I \div h$, may be simplified, and instead of p we must use f, the modulus of rupture. As $I = bd^3 \div 12$, and $h = d \div 2$, we find that $R = f\,bd^2 \div 6$, and if the section of the beam be square we have $R = f\,b^3 \div 6$.

Ex.—A cast-iron bar of solid rectangular section, 2 in. by 3 in., rests upon two supports placed 60 in. apart. Find the weight which will break the bar, assuming the load to be concentrated at the centre, and the value of f to be 13 tons. Here $R = f\,bd^2 \div 6 = (13 \times 2 \times 9) \div 6 = 39$ inch-tons. $M = Wl^*$, the precise expression for which by Ex. 3 (Chapter 21) is $Wl \div 4$; hence $M = W \times 60 \div 4$, and as $M = R$, it follows that 15 W inch-tons = 39 inch-tons. Therefore $W = 39 \div 15 = 2{\cdot}6$ tons, which is the required breaking weight.

Calculating the above example by the same rule, but using p to represent the ultimate tensile strength F_t of the material, say 8 tons, we arrive at a very different result :—

$R = (8 \times 2 \times 9) \div 6 = 24$ inch-tons. $M = W \times 60 \div 4 = 15$ W inch-tons, and for the breaking weight we have $W = 24 \div 15 = 1{\cdot}6$ tons. This load would not, as a matter of fact, cause failure of the bar unless the distance between the supports were increased to 97·5 in., when the bending moment would be responsible for a stress equal to 13 tons, which in this case is the value of f, the modulus of rupture.

Ex. — A wrought-iron bar of solid section, 2 in. square, rests upon two supports, placed 60 in. apart. Find the weight which will break the bar, assuming the load to be concentrated at the centre and the value of f to be 23 tons.

Here $R = f\,b^3 \div 6 = (23 \times 8) \div 6 = 30{\cdot}66$. $M = W \times 60 \div 4 = 15$ W inch-tons, and for the breaking weight we have $W = 30{\cdot}66 \div 15 = 2{\cdot}044$ tons.

If calculated on the basis $p = F_t$, say 20 tons, the following incorrect result would be obtained : $R = (20 \times 8) \div 6 = 26{\cdot}66$; $M = 15$ W inch-tons ; and $W = 26{\cdot}66 \div 15 = 1{\cdot}77$ tons. Again, this weight would be insufficient to cause rupture of the bar.

The modulus f cannot be regarded as a desirable factor, because its value is only to be ascertained by experiments, and there are different values for beams of the same material according to the form of section. In the absence of a better aid to calculation, the modulus of transverse rupture is of value, and if it were not used, the excess of strength given by the ordinary rule would inevitably lead to considerable waste of material. Although the use of the solid rectangular form is chiefly restricted to timber beams, yet there are often occasions when bars of cast and wrought iron are employed in such a manner that they are essentially beams. We have therefore considered it necessary to explain the rules by which their strength may be ascertained.

When a material such as wrought iron or mild steel, in which the values of F_t and F_c are approximately equal, is manufactured in the form of an I-beam, where the web is thin and the flanges constitute the chief part of the sectional area, the modulus of rupture is found to differ very little from F_t or F_c. Consequently, all calculations relative to strength may be based on rules which accord both with theory and with practice.

It is problematical whether the average architect often calculates for himself the strength of a steel joist or girder, and it is not absolutely certain that every architect could do so if he tried. As we shall now proceed to demonstrate, no mystery or difficulty is involved in the process. Reference has been made in a previous chapter to the probability that erroneous conclusions may be drawn from the accurate information contained in the little handbooks of steel sections whose dicta are generally—and blindly—accepted in this country. In these books the estimated safe permanent distributed loads are given for various simple and compound joists and girders, but the factor of safety is seldom stated. Sometimes the loads are calculated on the assumption that the ends of the beams will be firmly fixed. This stipulation is usually stated in a foot-note of the most unobtrusive character, which may be very easily overlooked. As the condition of fixity is rarely attained in practice, it is very undesirable that it should be adopted, because it directly involves the over-statement of strength by 50 per cent. Again, there is often a foot-note stating that in no case should the span exceed 20 or 22½ times the depth of the joist. This is a very proper stipulation, having for its object the avoidance of excessive deflection. But if the compilers of these books expect the rule to be observed, it seems unnecessary that they should print long lists of safe loads for spans which it is stated ought not to be employed. If these various pitfalls are to be avoided considerable care is necessary, and in many cases it will be less trouble for the architect to make the calculations entirely on his own account. For this purpose very little information is obtainable from the merchants' hand-book, for the moments of inertia and of resistance are seldom stated, and even the ultimate strength of the material is usually a matter for conjecture. There is one section-book to which these criticisms do not apply, and from which the beams mentioned in the following examples have been selected so that all the dimensions quoted shall be practical instead of suppositious.

Ex.—Find the safe load per lineal foot, under different systems of loading, for a rolled steel joist of the following dimensions:—Depth, 10 in., width, 5 in., web thickness, ·48 in., mean flange thickness, 6 in. ; ultimate strength of steel, $F_t = 32$ tons per square inch. By Table XLVIII., the moment of inertia for this section $I = (bd^3 - (b - b_1)\,d_1^{\,3} \div 12 = (5 \times 10^3 - (5 - {\cdot}48)\,(8{\cdot}8)^3 \div 12 = 1919{\cdot}64 \div 12 = 159{\cdot}97$; say 160, to simplify our explanatory calculations. By the rule stated in the earlier part of this chapter, $R = p \times I \div h$; p being in this case equivalent to F_t or F_c, which is 32 tons ; $h = d \div 2 = 5$ in. Consequently, for the moment of resistance of the section we have $R = p \times I \div h = 32 \times 160 \div 5 = 1{,}024$ inch-tons. Sometimes the moment of resistance is expressed in square inches, being represented by $I \div h$, so that it may be used for any variable value of F_t. We shall use the symbol R to denote the moment of resistance in this form. In our case $I \div h = 32$, and as $F_t = 32$ tons, $R = R \times 32 = 1{,}024$ inch-tons, as before.

Having settled these preliminaries, we can readily find the safe load under different systems of loading.

(a) *Uniformly distributed load, beam supported both ends :—*

$M = Wl \div 8 = W \times 12$ in. $\div 8 = 1{\cdot}5$ W inch-tons, and as $M = R$, 1·5 W inch-tons = 1,024 inch-tons, and $W = 1{,}024 \div 1{\cdot}5 = 682{\cdot}6$ tons. Using a factor of 5, the safe load would be 136·5 tons. If the ends of the beam could be rigidly fixed, the load might be increased by 50 per cent.

(b) *Concentrated load in centre, beam supported at both ends :—*

As $M = Wl \div 4$ instead of $W \div 8$, the safe load must be half that found in Ex. (a) above, or 68·25 tons. If the ends of the beam could be rigidly fixed, the load might be increased by 100 per cent.

(c) *Cantilever uniformly loaded :—*

As $M = Wl \div 2$, the safe load must be one-fourth that in Ex. (a), or 34·125 tons.

(d) *Cantilever loaded at free end :—*

As $M = Wl$, the safe load must be one-eighth that in Ex. (a), or 17·06 tons.

The simple cases taken above show clearly how the safe load for a beam may be calculated for a unit length of 1 ft. To find the safe load for any desired span, it is only necessary to divide the load by the length of the span in feet. Summarising the results obtained above, we have the following tabular statement :—

Safe Loads in Tons for Steel I-*beam, Size 10 in. by 5 in.*

(Tensile strength = 32 tons per square inch. Factor of safety = 5.

Type of beam.	Distributed Load.		Concentrated Load.	
	Span 1 ft.	Span 10 ft.	Span 1 ft.	Span 10 ft.
Supported at both ends..	136·5	13·65	68·26	6·86
Ends rigidly fixed	204·78	20·478	136·5	13·65
Cantilever ..	34·125	3·412	17·06	1·706

These figures obviously point to the necessity of the most careful consideration with regard to the manner in which any beam is to be used, and with the object of further emphasising the point, we append the "safe" loads distributed for similar 10 in. by 5 in. beams of 10-ft. span, as given in the hand-books of four different firms :—

Weight per ft.	F_t.	Ends.	Factor.	"Safe Load"	Loads for Supported Ends, Factor 5.
lbs.	tons				
A. 29	28·32	Fixed	3 (5)	20·9 (12·54)	—
A¹. 30	query	„	query	18·66	*12·4, perhaps 7·46*
B. 30	„	„	„	18·66	*12·4,* „ *7·46*
C. 30	„	query	„	18·31	*12·2,* „ *7·32*
D. 35	28·32	sup'r'td	5	13·65	13·65

The statistics in the foregoing table constitute a very interesting example of commercial mathematics, by the aid of which it will be observed the least desirable sections are made to appear the most desirable. Only in one case are the figures entirely satisfactory. In calculating the loads for supported ends, printed in italics, we have assumed that a factor of 5 was originally employed, except where the factor is stated. If the factor of 3 is involved in the uncertain cases, the smaller loads in the last column will be correct. The steel in examples A¹, B, and C is presumably of foreign manufacture, and such sections are largely bought by those who imagine them to be much cheaper than British sections. Probably this preference is largely due to superficial examination of section-books. No particular harm can be done if care be taken to use foreign sections which are equal to British sections in strength, but beams of insufficient strength may easily be selected in the absence of critical comparison. No doubt when a firm of steel merchants is consulted as to the proper dimensions of beams for any given duty, the information furnished will be altogether trustworthy ; but if beams are simply ordered from details contained in section-books, it is most likely that mistakes will be made because of the manner in which facts are ordinarily presented.

Hitherto we have assumed the dimensions of the beam to be known, and the load to be unknown. As these conditions are converse to those usually obtaining in practice, it will be useful to select examples in which the load and the system of loading are known, and from these data to ascertain the dimensions of the required beams. The operation is readily performed by the aid of a section-book stating the ultimate strength of the material, and the values of the moments of resistance $R = (F_t \times I \div h)$, or $R = (I \div h)$ for each section. The latter values may be specially calculated if desired, but it will save trouble to obtain a hand-book in which one or the other is given. For the purpose of preserving continuity in our inquiry, and of avoiding unnecessary repetition, the following examples are based upon those in

Chapter 21, and the same distinguishing numbers are used to facilitate reference. A factor of safety of 5 is applied throughout, the ultimate strengh of the material is taken at 32 tons per square inch, and suitable sections are selected from Dorman, Long, & Co.'s handbook, because the data we require are not contained in any similar publication. The weights of the beams are not taken into account and M = maximum bending moment in every case.

Ex. 1.—Cantilever 6 ft. long, having a load of 2 tons at the free end. M = 12 foot-tons = 144 inch-tons. As M = R, the moment of resistance of the section selected should be 144 × 5 = 720 inch-tons, or 720 ÷ 32 = 22·5 square inches. Referring to the table of joists in the section-book, we find the nearest approach to our requirement is represented by a section measuring 8 in. × 5 in., whose moment of resistance R is 23·46 square inches. This will give a slight surplus of strength.

Ex. 2.—Cantilever 6 ft. long, having a load of 2 tons equally distributed over the whole length. M = 6 foot-tons = 72 inch-tons. R should be 72 × 5 = 360 inch-tons, or R = 11·25 square inches. In this case the suitable section measures 7 in. × 3¾ in., and its moment R=11·99 square inches again giving a small surplus of strength.

Ex. 3.—Beam supported at both ends, span 6 ft., and a concentrated load of 2 tons in the centre. M = 3 foot-tons = 36 inch-tons, consequently R should be 36 × 5 = 180 inch-tons and R 5·625 square inches. The section whose moment of resistance is nearest to this measures 4⅝ in. × 3 in., and the value of R is 5·68 square inches.

Ex. 4.—Beam supported at both ends, span 6 ft., uniform load 2 tons. M = 18 inch-tons, R should be 18 × 5 inch-tons, and R = 2·812 square inches. The smallest section fully complying with the required conditions measures 3½ in. by 3 in., value of R = 3·35.

Ex. 5.—Beam supported at both ends, span 6 ft., concentrated load of 2 tons placed 2 ft. from left-hand abutment. M = 2·66 foot-tons = 31·92 inch-tons. R should be 31·92 × 5 = 159·6, and R = 4·98. The nearest section for use is a 5 in. by 3 in. size, R = 5·46.

Ex. 6.—Beam supported at both ends, 6-ft. span, two loads of 1 ton each placed 1 ft. from right and left hand abutment. M = 2 foot-tons = 24 inch-tons. R is to be 24 × 5 = 120, and R to be 3·75 square inches. The selected joist measures 4 in. × 3 in., R = 4·51.

Ex. 6a.—Beam supported at both ends, span 6 ft., total load 2 tons, made up of three separate loads at various points, as stated in Chapter 21. M = 34·32 inch-tons, R = 34·32 × 5 = 171·6, R = 5·36. A 5 in. × 3 in. joist whose moment of resistance in square inches = 5·46 is most suitable in this case.

Ex. 7.—Beam supported at both ends, span 6 ft., load 2 tons distributed over a length of 2 ft. in the middle portion of the span. M = 2·5 foot-tons = 30 inch-tons. R must be 150 inch-tons, and R 4·68 square inches. The best section for this case measures 5½ in. × 2 in., value of R = 4·69.

Ex. 8.—Beam supported at one end and at centre, span 6 ft., with a concentrated load of 2 tons at free end. Here M = 6 foot-tons; consequently the same section as used for Ex. 2 is suitable.

Ex. 9.—Beam with both ends fixed, span 6 ft., concentrated load of two tons at centre. M = 1·5 foot-tons, therefore the section used in Ex. 4 is suitable. It should be observed that, owing to the fixity of the ends, the force exerted by the load is half that produced by the similar load in Ex. 3.

Ex. 10.—Beam with both ends fixed, span 6 ft., uniform load of two tons. M = 12 inch-tons; R must be 12 × 5 = 60 inch-tons, or R = 1·875 square inches. The nearest corresponding section measures 4 in. × 1¾ in., R = 2·58. Owing to the ends being fixed, the force exerted upon this beam is only two-thirds of that produced by the same load in Ex. 4.

Ex. 11.—Continuous beam ends supported, two spans of 6 ft., each carrying a uniform load of two tons. The maximum value of M is the same as in Ex. 4, and a similar section is therefore suitable.

Some of the sections selected for the above examples are rather stronger than is really necessary, and in one or two cases it might be permissible to use a joist slightly below the standard fixed, especially as the factor of 5 is taken. The reader may find it interesting and instructive to calculate the stress-intensity for each example by the rule, $p = M h \div I$. Let us take Ex. 6 as an illustration. Here p = 24 × 2 ÷ 9·03 = 5·315; consequently, the factor of safety is actually 32 ÷ 5·315 = 6·02. If the next weaker joist had been selected, viz., 4¾ in. × 1¾ in., R = 3·57, the following result would have been obtained:—p = 24 × 2·375 ÷ 8·48 = 6·7217. This reduces the factor of safety to (32 ÷ 6·7217) = 4·76, which is less than the stipulated standard, but would probably be satisfactory in practice.

Deflection must always be considered, for a beam that may be of strength sufficient for the support of a given load may deflect to an undesirable degree. In bridge girders deflection is usually supposed to vary from $\frac{1}{1250}$ to $\frac{1}{2000}$ of the span; in building construction it ought not to exceed $\frac{1}{10}$ in. per foot of clear span, though the maximum is sometimes stated as $\frac{1}{30}$ in. If the span does not exceed twenty times the depth of the beam deflection will be sufficiently prevented. In the following rules for the determination of deflection the following symbols are used:—D = deflection in inches, W=load, l = length of span, E = modulus of elasticity (12,000 tons for steel), I = moment of inertia of beam:—

Beam supported at both ends, single load at centre, $D = Wl^3 \div 48$ EI.

Beam supported at both ends, uniform load, $D = Wl^3 \div 76{\cdot}8$ EI.

Cantilever, single load at free end, $D = Wl^3 \div 3$ EI.

Cantilever, uniform load, $D = Wl^3 \div 8$ EI.

The deflection resulting from a combination of loads can be found by considering the deflection due to each separate load and adding the amounts together, as in the case of bending moments.

Ex.—Take the beam in Ex. 3. Here W = 2 tons, l=72 in., E = 12,000 tons, and I = 13·17. Therefore, $D = 2 \times (72)^3 \div (48 \times 12{,}000 \times 13{\cdot}17) = {\cdot}098$ in. This represents about $\frac{1}{660}$ in. deflection per foot, and the amount is small because the span is little more than fifteen times the depth of the beam.

OBITUARY.

MR. J. T. IRVINE.—The death of Mr. J. T. Irvine, the architect's clerk of Peterborough Minster restoration works, occurred on the 6th inst. Born seventy-five years ago in the Shetlands, at an early age he developed great skill in architectural designing, and his mind having a profound archæological bent, gradually drew him into architectural work exclusively ecclesiastical. He was for many years Sir Gilbert Scott's right hand, and there existed between employer and employed an affectionate regard seldom realised. His tenderness of the memory for Sir Gilbert was shown in the dedication of an important illustrated pamphlet on "The Recovery of the Design of the West Front," to "the memory of my dear old Master," notwithstanding that Mr. Irvine was then a septuagenarian, and Sir Gilbert had long since passed away. He afterwards accepted an engagement with the late Mr. J. L. Pearson, and it was under this architect's auspices that nearly twenty years ago Mr. Irvine went to Peterborough to take over the Cathedral Central Tower Rebuilding which had then been decided upon. Here he remained, beloved by the workmen, the Cathedral authorities, and by every one who had the good fortune to have anything to do with him. His contributions were frequently published by the antiquarian and archæological societies of Great Britain. He was also a Fellow of the Scottish Society of Antiquarians. He had been engaged in many of the principal restorations of the past half century, including the extensive restoration of Bath Abbey, but the one with which his name will be most closely identified will be that of the Restoration of Peterborough Cathedral. Deceased leaves a widow and two sons.

GENERAL BUILDING NEWS.

RESTORATION OF UNION CHAPEL, HUNSTANTON.—Union Chapel, Hunstanton, has just been reopened, after restoration. In addition to a new organ, a sum of about 550*l.* has been spent over the chapel, schoolroom, and vestries. The work has been carried out by Mr. R. W. Fayers, of Lynn, under the general superintendence of Mr. Herbert Ibberson, architect, Hunstanton. The organ has been built by Messrs. Abbott & Smith, of Leeds.

CHURCH, GREAT HARWOOD, LANCASHIRE.—The foundation-stones were laid recently of the Emmanuel Church at the corner of Segar-street and Walmsley-street, Great Harwood. The building will be entirely of brick. Mr. F. J. Parkinson, of Blackburn, is the architect.

NORTH TRANSEPT, ST. MARY'S CHURCH, PLAISTOW.—The memorial-stone was laid on the 26th ult. of the new north transept at St. Mary's Church, Plaistow. Messrs. Wadmore & Mallett are the architects, and Mr. T. D. Graty is the builder.

NEW CHURCH, MEXBOROUGH.—The foundation stone has just been laid of a proposed new church at Mexborough, Yorkshire. The building is to cost 2,500*l.* The architect is Mr. J. N. Cowper, of London.

CATHOLIC CHURCH, COLWYN BAY.—A new church (St. Joseph's) has been erected at Colwyn Bay as a memorial to the Very Rev. Dean Lennon, for some years rector of Chorley. The edifice is situate in the west-end of the town, and is built of native stone, with Yorkshire stone facings and red-stone dressings, the design being Early English. Mr. Thomas Browne, Chester, is the builder, the architect being Mr R. Curran, Warrington. The clerestory is 75 ft. long and 48 ft. high, with two aisles. The sanctuary is 26 ft. long; there are two side chapels, with the usual vestry accommodation, and two entrances. The tower has been built up only to the height of the clearstory, but it is intended at some future period to complete it and erect a spire. The nave, arches, and interior dressings are of red stone, the columns of red granite, the open timbered ceiling being of pitch-pine. The altars were by Messrs. Boulton & Sons. The high altar and the altar of the Sacred Heart are gifts. Adjoining the church, which will accommodate 600 persons, is the presbytery, and both are lighted by electricity, the installation being by the Warrington Electric Power Company.

METHODIST CHURCH, ANNFIELD PLAIN, DURHAM.—The new church and schools erected by the Wesleyan body at Annfield Plain were opened on the 6th inst. The structure has been raised on the site of the old chapel. The estimated cost of the building is 2,400*l.*, and the expenditure upon the heating apparatus, repair and enlargement of the organ, &c., brings up the total amount to 3,000*l.* The seating capacity of the new church is for 700 persons, or double the number accommodated in the superseded structure. There is also a Sunday School. The building is of stone. The contractor was Mr. Thos. A. Turnbull, of Annfield Plain. The architect was Mr. G. T. Wilson, Blackhill.

RESTORATION OF CROFT CHURCH, NEAR DARLINGTON.—Croft Church was reopened on the 5th inst., after undergoing restoration. The work has been confined to the chancel and the extreme west end of the church. The chancel has been panelled in oak, and an oak reredos, designed by the architect for the restoration, Mr. W. S. Hicks, of Newcastle, has been erected. It was carved by Mr. Hedley, of Newcastle. The sanctuary has been paved with alternate squares of Frosterley marble and Barton limestone. Four rows of oak seats have been placed at the west end of the church, and the font has been restored to its ancient position. The contractor was Mr. H. Harwood, of Manfield.

ST. JUDE'S CHURCH MISSION HALL, PLYMOUTH.—The memorial stone marking the extension of the St. Jude's Mission Hall, Grenville-road, Plymouth, was laid a few days ago by Captain Julian, J.P. The extension consists of a minor hall in the domestic Gothic style, and will be built, from the designs and under the superintendence of Mr. B. Priestley Shires, by Mr. W. E. Blake. The work will complete the Grenville-road façade, and will be connected with the large hall by a doorway leading into the new minor hall, which will be 28 ft. long, 20 ft. wide, and 15 ft. high, with a large square bay projecting forward with a seat all round it, and having a four-light mullioned window filled with leaded lights. There will be a wagon-headed ceiling, and provision is made for still further extending the buildings in a northern direction by erecting another hall 38 ft. in length by 18 ft. wide. Internally, the walls all round the hall will be panelled in woodwork to the height of about four feet, and externally the building will be faced with Plymouth limestone, and with dressings of Portland stone to the windows.

CHURCH, YORK.—The foundation stone of St. Luke's Church, Burton Stone-lane, York, was laid on the 9th inst. Mr. Brierley, of York, is the architect, Mr. Ullathorne, of Selby, being the contractor. At present it is proposed to erect only the vestries, chancel, and aisles Brick is being used, with red pressed brick facings, and Ancaster stone for the windows, &c.

BRIDGEGATE PARISH CHURCH, GLASGOW.—The memorial stone of the new Bridgegate Parish Church in Commercial-road, Glasgow, was laid on the 9th inst. The church is being built from plans by Messrs. Wm. Baird & James Thompson, architects, Glasgow. Its front elevation in Commercial-road is of red sandstone. The building extends backwards to Wellington-lane, and will accommodate 700 persons.

WESLEYAN CHURCH, GOSPEL OAK.—The new Wesleyan Church at the corner of Lisburne and Agincourt roads, Gospel Oak, was opened on the 7th inst. The building will seat nearly 800 persons. Mr. Beresford Pite was the architect.

PRESBYTERIAN CHURCH, CRICKLEWOOD.—The new Presbyterian Church in Rondu-road, High-road, Cricklewood, was opened on the 7th inst. Mr. A. O. Breeds was the architect, and Mr. S. Halliday, of Stamford, the builder. The church will seat 610 persons.

WESLEYAN SUNDAY SCHOOL, MOSBROUGH, DERBYSHIRE.—The new Wesleyan Sunday school buildings at Mosbrough, near Eckington, were opened on the 6th inst. The new buildings are on a site at the back of the chapel and consist of two stories. Mr. John Wills, of Derby, was the archi-

tect, and the contractor was Mr. John Drabble, of Mosbrough. Messrs. Camomile & Son were the sub-contractors for the plastering; Messrs. Wragg & Son for the slating; Messrs. Bolsover Brothers for the joinery; and Mr. Lunn, of Eckington, for the plumbing. Messrs. Truswell & Son, of Sheffield, carried out the heating.

ST. PATRICK'S NEW CHURCH, LISBURN, IRELAND.—On the 10th inst. this building was dedicated. The church has been designed to give a bold west front towards the street, and this characteristic is carried out by placing the tower centrally with the principal entrance, and is to be capped by a spire, the bell staging and apex being of Armagh marble, rising to a height of 170 ft. from the ground. The nave is 124 ft. long by 32 ft. wide, and the aisles are 96 ft. long, and the height from floor to ceiling, 50 ft. The flooring of nave, aisles, and sanctuary is terrazzo, and the approach from the street will be in the same material. The materials used are stone from Dundonald with Dumfries cut-stone dressings. The confessionals are recessed clear of side wall along the aisles so as not to interfere during processions. The seating, communion rails, and organ gallery are made in pitch pine, polished. The edifice is designed in the Early English style. The building of the church was commenced over two years ago, and the builders were Messrs. Laverty & Sons. The architects were Messrs. E. & J. Byrne. The church is built to seat 1,200, and a sum of 10,000*l.* was incurred in the work. It is erected on the site of the old church.

BOARD SCHOOL, MILNSBRIDGE, YORKSHIRE.—The corner-stone of the new Board school at Pickford-street, Milnsbridge, was laid on the 26th ult. Mr. E. H. Lockwood, of Huddersfield, is the architect, and Mr. E. Cheetham is the contractor.

BOARD SCHOOLS, LAWRENCE HILL, GLOUCESTERSHIRE.—New schools are being built at Deanlane, Lawrence Hill, for the Bristol School Board. The schools will accommodate 900 children. Mr. John Mackay, of Kingswood, is the architect, the builder being Mr. A. J. Beaven, of Bedminster.

SCHOOL, PRESTON, LANCASHIRE.—The foundation-stone of the Hincksman Memorial school, at Preston, was laid on the 26th ult The building will be faced with Accrington brick and Longridge and Yorkshire stone. Mr. Robert Curwen, of London, is the architect, and Mr. G. Lucas the contractor.

TECHNICAL SCHOOLS, BARROW.—Mrs. Albert Vickers laid the foundation stone of new technical schools at Barrow on the 27th ult. The schools are being built by the Corporation of Barrow in Abbey-road, at a cost of 18,000*l.* to 20,000*l.*, from the competition designs of Messrs. Woodhouse & Willoughby, architects, of Manchester.

ADDITIONS TO GRAMMAR SCHOOL, RICHMOND, YORKSHIRE.—Considerable additions to the Richmond Grammar School premises have just been completed. The building of the new schoolhouse alongside the existing premises was not practicable, but a site has been secured on the north side of the town. Enclosed within the grounds of the new schoolhouse is the Grey Friars' tower, the remains of a monastery supposed to have been founded in the middle of the thirteenth contury. Until now the governors have not possessed a schoolhouse, and residences have been rented by the masters for the purpose of taking boarders. The new buildings include a house for the headmaster, and connected with it will be accommodation for younger boys, whilst the large wing running at right angles contains dormitories and studies for fifty older boys, two large day-rooms, dining-hall, an assistant master's rooms, and headmaster's study. Other assistant masters are lodged in a separate house. The new buildings with the site have cost about 7,000*l.* The architects are Messrs. Clark & Moscrop, of Darlington. The new buildings are built of faced stone.

BOARD SCHOOL, OULTON, SUFFOLK. — A new Board School has just been erected at Oulton. The school has been built to accommodate 150 infants. The building is constructed on the central hall principle. The central hall is 53 ft. long and 22 ft. wide, and divided by sliding partitions into three class-rooms. The entrance-hall is 8 ft. wide. At the end of the entrance-hall is a teachers' private sitting-room. The whole of the work has been carried out by Messrs. Searle and G. Beckett, of Carlton Colville, under the supervision of the architect, Mr. F. W. Richards, of Lowestoft.

BOARD SCHOOL, NORTHAM, SOUTHAMPTON.—The foundation-stone was laid recently of a new Board school in Kent-street, Northam. The architect is Mr. John H. Blizard, and Messrs. H. Stevens & Co are the builders.

SCHOOL CHURCH, CHORLEY MOOR, LANCASHIRE.—A school-church has been erected on Chorley Moor from designs by Messrs. Jolly & Buckley, architects, of Chorley. Mr. J. Hampson was the builder.

THEATRE OF VARIETIES, EUSTON-ROAD.—The foundation stone of the Euston Theatre of Varieties, opposite St. Pancras Station, was laid on the 12th inst. The building is at the junction of Euston-road, Tonbridge-street, and Argyle-street, and has been raised as far as the balcony tier. The frontage is to be of red bricks and buff terra-cotta, and the building will be flanked at each end by square towers. The auditorium measures about 55 ft. by 62 ft., whilst the height from ground floor to gallery ceiling is 60 ft. The seating accommodation above the ground floor will consist of a balcony with four private boxes—two on each side—and a large gallery over. The stage, which will be fitted with a fireproof curtain, is 47 ft. deep and 54 ft. wide, the proscenium opening being some 30 ft. in width. A range of dressing-rooms will be situated at the rear of the stage, access to which is gained from Tonbridge-street. The whole of the interior will be constructed of iron and concrete, including the roof. Messrs. Wylson & Long are the architects, Messrs. Kirk & Kirk the builders, and Mr. W. J. Strong the clerk of works.

THE NEW COUNCIL CHAMBER, LIVERPOOL TOWN HALL.—The City Council met for the first time in the new Council Chamber at the Town Hall on the 6th inst. The new chamber is 20 ft. 6 in. in height, 89 ft. in length, and 40 ft. 6 in. in width, and is an enlargement and reconstruction of the old chamber. It has a panelled mahogany dado 12 ft. high all round, with entablature, whilst the windows have quarter-circle jambs, with columns on square pedestals, and surmounted by segmental pediment, with panelled soffits. The ceiling is in fibrous plaster, divided into three parts by a deep entablature extending across the chamber, and resting at each end on Ionic pilasters of mahogany. The walls between the top of the dado and ceiling are hung with Tynecastle canvas decorated in gold and colour, and the ceiling is treated in tones of ivory buff and cinnamon, the ornamental parts being scambled and decorated with gold. Over the Lord Mayor's daïs or recess is a flat segmental arch with panelled soffit, a similar arch being placed on the south or opposite side. The room is lighted by electricity, the brass fittings being specially designed. The style of the work inside the chamber is a modern treatment of English Renaissance. The seating is mahogany, upholstered in tan-coloured leather, the seats being divided by upholstered arms. In front of each row is a continuous writing-table with a shelf underneath. Darley stone was used in extending the building. The principal contractors were Messrs. Brown & Backhouse, of Liverpool, who did the whole of the structural work, as well as the mahogany work in the dado, windows, and doors. Messrs. Waring & Gillow, Limited, carried out the decorative work, and Messrs. G. H. Morton & Son the furniture. The heating and ventilation were by Messrs. Dargue, Griffiths, & Co., and the electric fittings were supplied by Messrs Singer & Co., of Frome. The whole work was carried out from plans by the City Surveyor, Mr. T. Shelmerdine, who was assisted by Mr. John H. Dawson. Mr. R. Shakspeare was the clerk of the works.

MINERS' HALL, NEW HERRINGTON, DURHAM.—A Miners' Hall is to be erected at New Herrington. Councillor J. Palliser is the architect.

PAROCHIAL HALL, RATHMINES, DUBLIN.—The new Parochial Hall in Belgrave-square in connexion with Holy Trinity Church, Rathmines, was opened on the 31st ult. There are two halls, the larger seating about 300 persons, and divided from this is a smaller hall to seat about 100 persons. Mr. Frederick A. Butler, of Dublin, was the architect, and Mr. John Pemberton, the builder.

EXTENSIONS, INDUSTRIAL SOCIETIES PREMISES, SLAITHWAITE.—Extensive alterations and additions have been made to the premises of the Slaithwaite Equitable Industrial Society, Limited. The plans were prepared by Mr. J. Berry, of Huddersfield. Messrs. William Holroyd & Sons executed the mason work.

NEW CENTRAL BRIDEWELL, DUBLIN.—The foundations are now being laid of the new central Bridewell for Dublin. The site is adjacent to the police-courts, and the building will be connected with them by an underground passage. The plans were prepared by Mr. Howard Pentland; Messrs. Lowry & Sons, Belfast, being the contractors.

A NEW THEATRE, ST. MARTIN'S-LANE.—A site is being cleared for the erection of a theatre with a frontage of 75 ft. in St. Martin's-lane (west side), and a return frontage of 85 ft. along the north side of St. Martin's-court, which will be widened to 20 ft. at that end in alignment with the recent widening of the court along the south side of Mr. Wyndham's theatre. The architect of the new theatre, which will have a capacity for an audience of 762 persons, is Mr. Frank Matcham.

FLATS, BAYSWATER.—A large block of residential flats, to be known as Nos. 52-84, Palace-court, is being built, after the plans and designs of Mr. Edwin J. Stubbs, upon a site on the north side of Moscow-road, and opposite the roadway of Palace-court, leading into the main road to Notting Hill.

WARRINGTON UNION INFIRMARY.—A new Union Infirmary has just been opened at Warrington, on the north side of the workhouse. The infirmary stands upon 5¾ acres of land, apart from the land belonging to the workhouse premises. Three blocks of buildings are now complete, some 70 ft. apart, but connected on each floor by open-air corridors 10 ft. wide. The central is the administrative block, three stories high, and the two outer blocks are for ward pavilions, each two stories high. Under the whole of the buildings and corridors there is a basement for access to the heating and water pipes and for special ventilation and the securing of dryness in the rooms. The centre or administrative block gives accommodation on the ground floor for the medical officer and lady superintendent, with dispensary, waiting-room, nurses' sitting and dining-room, linen and other stores, and on the first and second floors are bedrooms and other apartments for the housing of the nursing staff, with both lavatories and closets. From this administrative block access is obtained by the open-air corridors into the male and female pavilions. Access can also be obtained from the administrative block to the different airing yards, where convalescents can sit out or take exercise. The two side blocks, or ward pavilions, are each similar in arrangement, and each gives accommodation for ninety-two beds—a total of 184. In each block there are two wards of twenty-four beds, two wards of twelve beds, two wards of four beds, and six wards of two beds each, and each set of wards has its separate arrangement of baths, lavatories, and closets. There are ward kitchens, linen-rooms, separation lobbies, and lifts for patients. The wards are heated by open fireplaces in the case of the smaller ones, and by central open-fire Musgrave's stoves in the large ones; but in all cases the heating is augmented by hot-water pipes or radiators. The floors throughout are fireproof, of Messrs. Homan & Rodgers' construction; and, although the buildings are equipped with stone staircases, there are also outer alternative stairs of iron from each pavilion. The premises are lighted by electricity throughout, generated by boilers, engines, and dynamos in a separate building. The electric lighting and plant has been carried out from the specifications, and under the superintendence, of Mr. T. L. Miller, E.E., of Liverpool, by the Warrington and District Electrict Light and Power Company; Messrs. Tinker's, Limited; and Messrs. Killick & Cochrane, of Liverpool. The general contract for the whole buildings, and for the boilder and engine house, has been carried out by Mr. C. W. Davenport, of Stockton Heath, with the assistance of the following sub-contractors:—Mr. William Winstanley, plumbing; Mr. Osborne, plastering; Messrs. C. W. Williams, tiling; Messrs. Williams & Clay, grates; Messrs. Twyford & Co., sanitary fittings; Messrs. Homan & Rodgers, fireproof floors; Messrs. Killick & Cochrane, heating and hot water; and Messrs. Clark, Bunnett, & Co., lifts; the work throughout being from the designs and erected under the superintendence of Messrs. William & Segar Owen, architects.

NEW POST OFFICE BUILDING, MOUNT PLEASANT, LONDON.—The postal authorities at St. Martin's-le-Grand have just taken possession of their new quarters at Mount Pleasant. This is preparatory, says the *Daily News*, to the rebuilding of Smirke's General Post Office, set up on the site of an old college in 1829, and which for many years more had sufficed for all the purposes of the department. The branch of the postal organisation that is to be cleared out and permanently transferred to Mount Pleasant is the provincial service, the London and foreign branches remaining where they are, and eventually occupying the whole space thus vacated after reconstruction of the building. The new quarters adjoin those of the Parcel Post that has long been located on the site of old Coldbath-fields Prison, and will be utilised by the provincial service about to be transferred. The prison cells still in existence will not be needed for space, but they are admirably adapted for the security of mails detained there from any cause, though eventually, no doubt, these cells will give way to modern buildings. The new structure, which has been in hand since Christmas twelvemonth, and from first to last, including all fittings, will have cost somewhere about 113,000*l.*, is virtually an extension of the Parcel Post premises, the main floors of the two departments being separated internally by a glass partition. The main floor has an undivided area of 37,600 ft., being 360 ft. long and 160 ft. wide. The floor is laid with blocks of maple, the walls are of white glazed brick, and it is lighted with arc-lamps. The sorting-tables have all been specially constructed. There is a basement floor down below of a similar extent. This will serve as an overflow accommodation, if necessary, at Christmas and New Year, and at ordinary times will be used for the sorting of the empty sacks shot down on to a platform from the floor overhead. Above there is a floor of half the extent, half of which is appropriated to the registered letter department. It is shut off by wood and wire-work partitions, and the sorting-tables are specially constructed with a view to the individual responsibility of every officer engaged. The half of this floor not devoted to registered letters will be given up to the Irish, Scotch, Great Eastern, and South-Western mails, the main floor below taking all other provincial mails. On the floors above there is accommodation for the 1,500 hands constituting the provincial staff at headquarters. There are dining-rooms and tea-rooms, kitchens and sculleries, and pantries and reading-rooms for those who are temporarily off duty. There are also several bedrooms for superintending officers whose hours of duty render it convenient to sleep on the premises. There is a bath-room for their convenience, and on all the floors there is lavatory accommodation. Electric lifts at different points about the building run from top to bottom, and every floor has its great clock, all of them—with one exception—being electrically driven and regulated. The new premises have been erected by Messrs. Lorden, of Upper Tooting, the clerk of the works being Mr. T. Leake.

CO-OPERATIVE INSTITUTE, SEDGLEY, STAFFORDSHIRE.—On the 26th ult. the foundation stone was laid of a new building at Red Hall, Lower Gornal, Sedgley, which is being erected by the Dudley Co-operative Society. The building, which is to be called the Co-operative Institute, consists of two shops, an assembly-room, and residence for the manager. It is being built by Mr. W. Slater, Lower Gornal, from plans prepared by Mr. A. Ramsell, Dudley.

BUTTER MARKET IMPROVEMENT, IPSWICH.—The butter Market, Ipswich, has been widened by setting back the buildings on the north side of the narrow portion of the thoroughfare. A new shop has been erected at the corner for Messrs. Alston & Moir. The architect was Mr. E. F. Bisshopp, of Ipswich, and Mr. Chas. Roper was the builder. A butcher's shop adjoining has been erected from plans by Mr. T. W. Cotman.

TOWN HALL, GODMANCHESTER.—On the 24th ult. the new Town Hall at Godmanchester was opened. Last year it was decided to improve the Council Chamber, demolish all the other portion, and build up suitable premises. Messrs. Townsend & Fordham, Peterborough, were the architects, and the contract of Messrs. F. B. Thackray & Co., Huntingdon, was accepted.

POST-OFFICE, WEST HARTLEPOOL.—The new Post-office in Whitby-street, West Hartlepool, was opened on the 8th inst. The building has a frontage of over 85 ft. and a depth of 100 ft. The exterior is faced with Ruabon buff terra-cotta.

THE NEW CITY POORHOUSE, ABERDEEN.—At a meeting of the Works Committee of the Aberdeen Parish Council on June 1 it was agreed to recommend to the Council that Messrs. Brown & Watt be appointed architects for the new poorhouse buildings at Oldmill.

SANITARY AND ENGINEERING NEWS.

A NEW DRAIN-PIPE JOINT.—The complete specification of another patented joint for drain-pipes has recently been sent us. The inventor is Mr. Alfred C. Trew, of Ipswich. The special features are that a projecting ring is formed on the pipe an inch or two from each end, and that a separate channel or half-socket is provided to receive the ends of adjacent pipes; the ends of the channel are curved to the same radius as the pipes, so that the latter have a firm bearing, but the central portion of the channel has a larger radius than the projecting rings on the pipes, and the space thus formed between the channel and pipes is filled with cement to complete the lower half of the joint; the upper half is simply formed by covering the space between the projecting rings with cement-mortar. These rings are of dove-tailed section in order to afford a better key for the cement. Additional security is proposed to be given by forming a V-shaped sinking in the end of each pipe, and by filling the space thus formed with "white lead, putty, or the like," and by inserting in it if desired a strip of metal. The channels have flat bases, and therefore obtain a firm bearing on the ground. The principal advantages of the joint, in our opinion, are that it is easily formed and gives little opportunity for scamping, as the work can be inspected without much difficulty. On the other hand, a large quantity of cement is required to make the joint, the exposed cement forming the upper half of the joint will be liable to injury in filling the trench, and special care will be required in laying, as otherwise the pipes will be supported only at the ends, and therefore liable to fracture.

WATERWORKS, PENMAENMAWR, CARNARVON.—The new waterworks constructed by the Penmaenmawr Urban District Council were opened on the 6th inst. The works include a service reservoir of 100,000 gallons capacity on the Mountain-lane above Bryn Tolyn, and a large reservoir of a capacity of 1,000,000 gallons. The total cost was about 13,000*l.* Messrs. Wood & Brodie, of Liverpool, were the engineers; Mr. Coverley and Mr. Ernest Worrall, the District Surveyor, acted as resident engineers successively.

THE WATER SUPPLY OF MANCHESTER.—The Manchester *Evening News* says that the Waterworks Committee present the following report, signed by Sir John Harwood:—Your Committee, having regard to the past few years' experience of the large increase in the consumption of water, are somewhat alarmed at the possibility in the near future of the supply being short of the demand. They cannot put away from their minds the conviction that the public generally have the idea that Thirlmere will afford an exhaustless supply for all time, and this has led, if not to actual waste, at least to a very excessive increase in the consumption, and they desire, if possible, to remove this false impression. Bearing in mind that altogether from every source, so far as they are at present aware, there is an available quantity of 25 million gallons per day from Longdendale, and there will be 50 million gallons per day from Thirlmere when the works are completed, though this is not absolutely certain, but simply the nearest estimate of the maximum supply that can be obtained, making 75 million gallons per day; looking at the increase in the consumption during the last ten years, and then during the last five years, the question is how long the whole quantity of water at your Committee's disposal will last before it is overtaken by the consumption. The consumption at the present time is practically 32 million gallons a day, and the increase during the last ten years has been at the rate of over 1 million gallons per day per annum. Taking into consideration the progressive increase in the population supplied and in the demand for water upon the same basis as at present, that is, increase upon increase, your Committee are of opinion that, at the rate of consumption stated, the whole 75 million gallons per day is likely to be overtaken in about thirty-five years. They therefore feel it their duty to make this emphatic statement, so that all citizens and consumers may realise their personal responsibility for the proper and moderate use of the water. Of course, it will be necessary to call the attention of the various public bodies in the district of supply to this very serious and rapid increase in the consumption of water, as there are many cases where the streets have been watered with great liberality, though not perhaps unnecessarily. There has also been a large increase in the number of water-closets, and the question is whether your Committee have such quantity of water at their disposal as to sustain this demand. Your Committee would suggest that the Council authorise them to take immediate steps in reference to the laying of another pipe from Thirlmere, and also to engage Mr. G. H. Hill, C.E., to act as consulting and advising engineer on terms to be agreed upon, and to appoint such other engineers and take such other steps as may be necessary to carry out the work.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, ATTERCLIFFE CHURCH, SHEFFIELD.—A stained-glass chancel window has been erected in Attercliffe Parish Church to the memory of the late Dr. George Huntsman Shaw. It was executed by Messrs. Jeffery & Foster, of Sheffield.

MEMORIAL WINDOW, ST. MARY'S CHURCH, NOTTINGHAM.—A stained-glass window has been inserted in this church to the memory of the late Mr. and Mrs. T. C. Hine. The window overlooks the font. It was the work of Messrs. Clayton & Bell.

STAINED-GLASS WINDOWS, NEWCASTLE CATHEDRAL.—Two stained-glass windows have been erected in Newcastle Cathedral—one, a memorial window, in the south aisle, and the other in the south transept. Both were the work of Mr. Kempe.

FOREIGN.

FRANCE.—The first awards at the Paris Exhibition were voted last week, the Jury for the Section of Painting awarding twenty "medailles d'honneur" as follows:—*France*—MM. Henner, Cazin, Dagnan-Bouveref, Harpignies, Hébert, Roll, and Vollon; *England*—Sir L. Alma-Tadema and Mr. Orchardson; *Germany*—Herr Leybach and Herr Klimt; *Belgium*—Herr Struys; *United States*—Mr. Whistler and Mr. Sargent; *Spain*—Senor Sorolla y Bastida; *Denmark*—Herr Kröyer; *Holland*—Herr Israels; *Norway*—Herr Thanlow; *Russia*—M. Serof; and *Sweden*—M. Zorn.

CANADA.—The Ontario Association of Architects has prepared a tariff of professional charges which has recently been distributed, and may be summarised as follows:—For full professional services (including supervision), 5 per cent. upon the cost of the work, except when the cost is a small one; the minimum cost fixed for simple work is $5,000, and for work of a more complex character $10,000. For warehouses and other plain work the fee to be charged may be from 3 to 5 per cent. There are modifications also in the event of work being abandoned, and where partial service only is rendered by the architect. Necessary travelling expenses are to be paid by the client. Time spent by the architect in visiting for professional consultation, &c., will be charged for, whether or not any commission, either for office work or supervising work, is given. Consultation fees for professional advice are to be paid in proportion to the questions involved, at the discretion of the architect. The Association is of opinion that a better result is always obtained by the direct appointment of an architect for any given work than by the selection of an architect by the process of competition. Any attempt to secure work by offering to prepare preliminary sketches, &c., or to render full professional services at a less rate of compensation than another architect, is to be deemed unprofessional conduct.——Professor Mavor, of the Toronto University, who was commissioned by the Ontario Legislature to study the effects of the English Workmen's Compensation Act, and the working of laws relating to the subject in all European countries, has reported that, in his opinion, it is desirable for the Ontario Legislature to wait some time before proceeding with a Bill on the same lines, in order to ascertain more fully what has been the effect of the change of principle in the English laws.——Several influential American Architectural Societies have approved of a code for governing competitions.

MISCELLANEOUS.

PROPERTIES FOR SALE.—(1) The building lease of the land, covering a total area of 30,000 ft. superficial, at present covered by St. Mary's R.C. Church, schools, and presbytery, and the (old) Royal London Ophthalmic Hospital, Moorfields. The hospital site was sold for 78,000*l.*; the new hospital buildings in the City-road, designed and planned by Messrs. Keith D. Young & Hall, and built upon a site leased for ninety-nine years from the Ecclesiastical Commissioners at an annual rent of 1,210*l.*, were opened in February, 1899. St. Mary's Church, built in 1817-20 after John Newman's designs, the schools and the clergy house, have been purchased for 202,000*l.*; the final service was celebrated on November 21 last year.* (2) Gough Park, Enfield, with grounds extending over 24 acres, through which runs a now disused course of the New River, situated at the upper end of Baker-street, near Forty Hill, Enfield. The house was bought in 1723 by Harry Gough, M.P. for Bramber, and passed to his son Richard Gough, the celebrated antiquary, who inherited it from his mother in 1774, and resided there until his death in 1809. The property was recently bought in at auction for 7,500*l.*, the biddings having reached to 6,900*l.* (3) Avery Hill, Eltham, 81 acres. The house was built of red brick and Portland stone, and fitted and decorated in a very expensive manner for the late Colonel J. T. North (better known perhaps by his *sobriquet* of "The Nitrate King"); it formed the subject of a well-known suit between him and his architect. A description of the house will be found in our issue of July 16, 1892.

A LEEDS STREET IMPROVEMENT. — An arbitration was commenced in the Council Chamber of the Leeds Town Hall on the 8th inst., for the purpose of assessing the amount of purchase money and compensation to be paid by the Corporation to Mr. J. A. de Macedo in respect of the compulsory acquisition from him of premises situate in East-street and Zion-street, including a public-house known as the "Dusty Miller Inn." The buildings, which are required in connexion with the proposed widening of East-street, cover an area of 438 square yards. The inquiry is being held before Mr. J. F. Field, of Chancery-lane, London, the umpire appointed by the arbitrators, Mr. John Hepper, acting on behalf of the claimant, and Mr. J. M. Fawcett representing the Corporation. Mr. A. W. Bairstow (instructed by Messrs. Markland, Davy, & Wood, solicitors) appeared for the claimant, and Mr. J. H. Balfour Browne, Q.C., and Mr. W. J. Waugh (instructed by the Town Clerk) for the Corporation. Mr. Thomas Winn, architect and surveyor, Leeds, was the first witness. He valued the public-house at 4,400*l.*, and the remainder of the property, consisting of four shops and two cottages, at 1,073*l.* He added 10 per cent., or 547*l.*, for compulsory purchase, making a total valuation of 6,020*l.* These figures were accepted by Mr. Tom Hutton, auctioneer and valuer, Leeds, and Mr. William Walsh, valuer, Morley, who were also called on behalf of the claimant's case. Mr. Balfour Browne then opened the case for the Corporation.

BRISTOL CORPORATION CONTRACTS AND CONDITIONS OF EMPLOYMENT.—At a special meeting of the Bristol City Council on the 8th inst., Mr. G. F. Jones, pursuant to notice, moved the following resolution:—"That, in order to effectually carry into effect the resolution of the Council of March 10, 1891, the following clause be inserted in all future contracts entered into by the Corporation: The contractor shall pay the recognised standard rate of wages to all workmen employed by him in the performance of this contract, and shall observe the hours and other conditions of labour of the various trades in the district. No part of the work shall be sub-let without the written sanction of the Corporation, and the contractor shall be held responsible in the event of any breach of the conditions of the contract by the person or persons to whom any portion of the work is sub-let. The penalty for each breach of these conditions shall be the sum of 50*l.*, or forfeiture of the contract, at the option of the Corporation." The mover explained that the object of his resolution was to remedy defects in the operations of the existing resolution on the subject by giving the Council control over sub-letting by contractors, and by bringing in a clause dealing with the hours of labour. The absence of a reference to hours of labour in the existing resolution had opened the door for some contractors working their men for an unlimited number of hours. The resolution he now moved would bring the Bristol resolution nearer those of other similar large cities.—Mr. Pope seconded the resolution. He pointed out that agreements between employers and workmen as to wages, hours, and conditions of work were a recognised thing, and the two sides having arrived at this understanding, the whole of the contractors employed by the Corporation should be compelled to abide by the agreement, so as to prevent unfair competition. No friction would arise from passing such a resolution as that moved.—Mr. Arthur Lee said if this resolution was carried the Council would

* The convent, refuge, and home, established by Canon Gilbert in Crispin-street—Mr. John Young, architect—was opened in 1868. The building cost 12,000*l.*

have nothing else to do than to go into minute regulations arising out of contracts and interfering constantly between the contractor and the persons to whom he sub-let. The number of sub-contracts made was enormous. The resolution was so sweeping, that a contractor, say for building a new Council house, who might contract for the bricks, would under the resolution have to get from the Corporation a written consent or he would have to make the bricks himself.—Mr. Elkins felt if the Council had regulations for a matter of this kind it was most essential that they should have a regulation dealing with sub-letting.—Alderman Proctor Baker said the wording in reference to the hours was ambiguous and the proposal with regard to sub-letting would entail difficulties. Such matters were always left to the architect. Suppose a contractor got part of his work done in a foreign country. Sashes and doors were imported from abroad, machinery and iron were also, a great quantity of electrical machinery came from America; was the contractor to be held responsible if these things were not produced under conditions applicable to the industry in their own country? He suggested that a conference should take place between the chairmen of committees and representatives of workmen and a legal and proper resolution be formulated.—Mr. Barnett said the difficulties foreshadowed did not seem to have occurred in Liverpool or other towns having similar resolutions in force.—After further discussion, the Lord Mayor suggested that Mr. Jones would do well to accept Alderman Baker's suggestion.—Mr. Jones agreed on condition that one of the working-class representatives was on the committee considering the matter.—Alderman Baker then moved in the sense in which he had spoken, and the Council accepted the proposition.

SANITARY INSPECTORS' ASSOCIATION.—On Saturday last a large number of the members of this Association attended at Ilford Cemetery to pay a last tribute of respect to the memory of a deceased colleague, who from the foundation of the Association had been hon. treasurer, viz., the late C. W. Raymond. Over 200 members of the council and of the Association, including nearly all the foundation members resident in or near London, attended the funeral of the late Mr. Raymond, who was an inspector of factories at the East-end of London and one of the founders of the society. An extraordinary general meeting of the members of the Association will be held on Saturday, June 23, to elect a successor in the honorary treasurership, and for other business.

THE CHURCH AT SARONNO.—An article in the *Churchwoman* of the 8th, signed "E. S. Child," draws attention to the interest of the paintings by Luini and Ferrari, in the "Sanctuary of the Blessed Virgin" at Saronno, on the way from Milan to Como, but not on the route taken by most travellers. The church, a simple and plain interior otherwise, contains some very fine frescoes by the two artists named. An illustration of one of the Luini frescoes is given.

CAPITAL AND LABOUR.

STRIKE OF MASONS AVERTED AT HAWICK.—A threatened strike of masons at Hawick has been averted. The masters intimated that they intended to reduce the wages from 9d. to 8d. per hour, and the men threatened to cease work if this were done. It is announced now that the masters have given way on the point.

THE PETERHEAD MASONS' STRIKE.—The Peterhead masons came out on strike on the 4th inst. in consequence of the masters having reduced their wages from 7½d. to 7d. an hour. The men refuse to accept the reduction on the ground that their wages are still ½d. under the Aberdeen rate.

EDINBURGH AND LEITH MASONS.—A mass meeting of the Edinburgh and Leith Branch of the United Operative Masons' Association of Scotland was held on the 6th inst. in the Oddfellows' Hall, Forrest-road, to receive the reply of the employers to a decision of the men to adhere to the working rules in force last year, and not to continue work after June 6 if the wages were reduced from 9½d. to 9d. per hour. Mr. Nolan presided. A discussion, which lasted for an hour and a half, was started by Mr. Craig moving that the resolution of the last meeting to strike be rescinded on account of a feeling that the vote on the question of strike or no strike should be taken by ballot. Ultimately the debate practically resolved itself into one of strike or no strike, in the course of which it was pointed out that in case a strike took place there was no outlet for the men in Scotland, trade was so dull, and that it would take 1,200*l.* a week to keep the men out on strike. Others expressed more hopeful views. On a show of hands being taken, only a few supported the proposal to rescind the former resolution, while the majority supported the motion to approve of the minutes and to come out on strike. The Chairman next stated that certain employers had signed circulars of agreement sent out by the men. A letter was read from W. Haig Slater stating that he agreed to pay the masons employed by him at the rate of 9½d. per hour until the dispute was settled, after which he would abide by the Masters' Association's decision, and a similar statement was submitted on behalf of John Best, Leith. It was agreed not to accept the terms of this letter, and that forms of the circular agreement should be sent immediately to all the master masons. Thereafter the letter from Mr. Nicol, Secretary to the Master Masons' Association, was formally read and laid on the table. It was to the effect that the employers had unanimously agreed to adhere to the terms recommended at the conference between the masters and the operatives, that the wages be reduced a ½d. per hour, and that the by-laws remain as at present.

DUNDEE SLATERS' STRIKE.—The strike amongst the Dundee slaters has come to an end. On the 8th inst. a mass meeting of the men on strike was held in Dundee, when forty men affected by the dispute attended. After a sitting of an hour and a half, it was resolved to accept the masters' terms, on account of the apathy of some of the members, who had, since the beginning of the strike fully a month ago, disregarded the Union rules. The men were recommended to accept 8½d. per hour, and to find employment wherever they could get it.

LEGAL.

HALIFAX BUILDING DISPUTE.

THE case of Shoesmith *v.* T. S. Dodd, Limited, came before the Court of Appeal composed of the Master of the Rolls and Lords Justices Rigby and Collins, on the 12th inst., on the appeal of the defendants from an order of Mr. Commissioner Bosanquet, Q.C., on November 4 last, restraining the defendants from building on a strip of land in Rufford's-road, Skircoat, Halifax, otherwise than in accordance with the building conditions and stipulations under which the land was put up for sale in 1871. The building scheme imposed the condition that a building line 60 ft. from the road should be observed, but the defendants, who purchased in 1898, gave notice of their intention to build right up to the frontage of Rufford's-road. They contended that they were entitled to disregard the building line on the ground that the plaintiff himself had infringed it by allowing his tenant to erect a billiard-room and conservatory in his grounds which occupied a space of 32 ft. in front of the building line. That building had been removed before the action was brought, but the defendants submitted that when they bought their land they had been advised that Mr. Shoesmith's conduct had prevented him from insisting upon the building line, and that they spent their money on the faith of that, and in the expectation, afterwards realised, that they would be able to come to an arrangement with the only other person interested.

Mr. Tindal Atkinson, Q.C., Mr. W. H. Upjohn, Q.C., and Mr. Manisty, appeared for the appellants, and Mr. Scott Fox, Q.C., and Mr. Bairstow for the plaintiff in the action.

In the result their lordships, without calling upon counsel for the respondent (plaintiff), dismissed the appeal with costs.

A QUESTION OF FEES.

AT the Lambeth Police-court on Tuesday afternoon Mr. Francis had before him the case of Marsland *v.* Wallis & Sons, Messrs. G. E. Wallis & Sons, builders, of Maidstone, being summoned by Mr. Ellis Marsland, District Surveyor for Camberwell and a portion of Dulwich, for 32*l.* 1s. 3d., being fees alleged to be due from the defendants in respect of the erection by them of a Board School at Grove Vale, Dulwich. Mr. R. C. Glenn (instructed by Mr. Williams) appeared in support of the summons, and the defendants were represented by Mr. E. E. Humphrys. In opening the case, Mr. Glenn said the claim was made under Section 154 of the London Building Act, 1894. He gathered from the correspondence with the defendants that they claimed that under one of the clauses in the Act of 1894 the building was exempted from the provisions of that Act, and that they were only liable to the fees payable under the provisions of the Act of 1855—the Metropolitan Building Act. The section on which that contention was based was Section 21 of the Act of 1894, which said:—"Notwithstanding anything in this Act, any buildings to be erected upon any lands now belonging to the School Board for London, or over which they have powers of compulsory purchase, or may acquire such powers in the present session of Parliament, may be erected in accordance with the provisions of any Act in force immediately before the passing of this Act." With regard to that his submission was that that section, which was very carefully drawn, was inserted for the purpose of allowing the erection of buildings under the provisions of the old Act upon lands which the Board had already acquired, or for which they had already obtained powers. Of course that would be reasonable, because the Board would no doubt have entered into contracts with builders for the erection of schools on the assumption that the provisions of the Act of 1855 would be the provisions that would govern those erections. But, he submitted, the clause was only in respect of the erection of the buildings, and did not include the District Surveyor's fees for the supervision of the work. He thought it was quite clear that the Legislature intended that in respect of new buildings the Board should be liable to the same fees as other people.—Mr. E. Marsland was called and gave formal evidence in support of the claim.—Mr. Humphrys, in laying before the Court the case for the defendants, contented that Section 21 was put in as a particular exemption for the London School Board, and that there could be no possible doubt as to the meaning of it. The section clearly said that the building might be erected in accordance with the provisions of the old Act, and if that was so, then the Act of 1855 applied to the fees to be paid to the District surveyor.—Mr. Francis questioned whether all the facts that were necessary were before the Court.—Mr. Humphrys replied that it was admitted that the site for this school was acquired before the passing of the Act of 1894. The question was whether the surveyor was entitled to charge under the new Act or the old. He submitted that the surveyor was bound by the provisions of the old Act, and was only permitted to charge the fees provided by that Act.—Mr. Francis said the case was one he would like to consider, and he accordingly reserved judgment.

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

2,971.—ARC LAMPS: *H. F. Bagley.*—The globe is exhausted of air or is filled with a gas, or the air is rendered incapable of supporting combustion by maintaining an arc within it. The electrodes are inserted through necks and packing-rings, to be compressed with tapered or screw plugs. For preparing the globe a connecting-piece is attached with a tube which is first exhausted, then filled with a gas, and closed by the insertion of the second electrode through necks provided with packing-rings.

2,997.—TRAPS: *F. Hutchison.*—The tongue is lengthened so that it shall project above the level of the top of the opening, and thereby determine the height up to which the water in the trap can rise. In another shape of the contrivance the water is caused to flow over tongues and so through ports to the outlet. The trap may be either rectangular or circular in cross section.

3,054.—WALLS AND FLOORS OF CONCRETE: *F. C. A. Bremer.*—Pipes, embedded in concrete or cement, are used for the construction of hollow walls and floors, a stiff concrete being first applied to the ends and joints of the pipes in the case of a liquid cement or concrete being employed. For the purpose of deadening sound, or facilitating the ventilation, heating, and drying of the floors short connecting tubes are arranged amongst the pipes. For making hollow blocks the pipes are laid within a mould, into which concrete is then filled.

3,064.—LEVELS, THEODOLITES, TELEMETERS, AND SIMILAR SURVEYING INSTRUMENTS: *G. A. Hall.*—The telescope is fashioned with its body squared, and the stadia wires are carried by a circular focussing-tube. To the body of the telescope is affixed a plate on which is a graduated semicircle to be read by a vernier that is adjustable by means of a milled head and whose spindle carries a spirit level; a slow-motion screw sets up true level, three bridge-pieces projecting from a hemisphere which turns in a cup, and is fastened in any required position with a screw carrying the vertical spindle of the telescope; a circumferenter is screwed around the cup's rim, the hemisphere carries a compass and a transparent spirit-level.

3,066.—WASTE-WATER FITTINGS: *F. Shanks.*—At the bottom of the sink, or basin, is formed a conical recess, into which the grating is fitted, screws being used for joining the grating to the discharge pipe, the valve being made with a flexible periphery, and a hinged grating protects the inlet into the overflow pipe; in an alternative form the conical seating or recess is fashioned at the top of a short sleeve, which is made in one piece with the grating.

3,109.—SHEET-METAL COVERINGS FOR WALLS AND CEILINGS: *W. Ruttenberg & M. van Zanten.*—The coverings are intended for use in kitchens, bath-rooms, stores, offices, hospitals, workrooms, &c.; they consist of galvanised metal plates, whose side edges are bent over for engagement with vertical undercut wooden frames or bars, which are screwed on to bars or battens fixed to the masonry; in a variant method the plates are fastened to angle-iron frames that are strengthened with cross-bars and vertical central bars, T-shaped in their cross-sections. For constructing hollow partition walls the metal plates are fastened on to grooved standards upon both the sides.

3,210.—METHOD OF FIXING LEAD FLASHING: *M. F. Curtin.*—The inventor has devised split tubular wedges, which are to be driven into the mortar joints of the brickwork. They are made of steel, or of sheet metal, blanks and strips, which are bent to any desired shape in cross-section, and are corrugated or provided with projections for engagement with the mortar.

3,231.—AN APPARATUS FOR QUICKLY OPENING WINDOWS: *E. Walsh.*—The apparatus is devised for sudden use in emergencies, as, for instance, at the outbreak of a fire in a factory or workshop. Troughs are fixed to the sashes, into which jets of water are turned down by means of hoods, the sashes being glazed with wire-glass, which cannot

be broken by water delivered by a hose-pipe, whilst resisting the spread of fire.

3,240.—CIRCULAR-SAW GUARDS: *F. Malkin, F. F. Binks, & F. Foster.*—The two pieces of the guard, which are L-shaped in cross-section, slide the one within the other. They are slotted for their adjustment by means of a bolt to the support at the end of a square rod; the rod rises or falls within a socket at the end of a radial arm, which is arranged so as to slide in the top of a pedestal fixed at the back. The riving-knife is pivotted on to the end of the two pieces which constitute the guard.

3,246.—WATER-WASTE PREVENTERS AND SIPHON-DISCHARGE: *H. von Hosstrup.*—A float-arm holds down the main valve under normal circumstances, and its inner end, which is quadrant-shaped, presses against the sleeve of the valve; as the float rises, or tends to rise, a pressure downwards is transmitted to the valve, and when the latter is lifted by the hand it is sustained also by the float; when the level of the water falls the float falls also, so as to free the valve and cause it to fall upon its seating, then the siphon discharges the rest of contents of the cistern as an after-flush.

3,303.—BALL AND FLOAT VALVES: *A. Clarke.*—The ball and float valve is devised for use in flushing-tanks; upon the body of the valve, which is affixed to the cistern or tank, is formed a dome on to which is screwed a carrier, within which is a slide that is moved by means of a bell-crank lever joined to the float-rod; the slide is joined with a short and curved rod to the leather or other valve, which is secured to the valve seat on one side; the hooked float-rod is joined with a bent wire and a screwed cap to the ball-float.

3,307.—MAKING OF POTTERY, BRICKS, TERRA-COTTA, &c.: *V. Micheli.*—A composition is made of an inferior quality of clay, or some other earthy material, powdered and burned, mixed with a suitable binding substance; the latter, however, may be dispensed with when the burned earth embodies a sufficient amount of lime.

3,319.—CLEANSING OF WATER TUBES AND SMOKE FLUES: *H. A. Ruggles.*—The cleaner can be worked either by hand or with steam; it consists of a central shaft at whose head (upon its outer end) are formed a set of faces; to each face is attached a blade having an outer cutting edge, and rendered adjustable with a sliding sleeve that engages with a nut and the hinged arms of the blades; for purposes of cleaning a tube the contrivance is pulled forwards and backwards; when it is required to remove scale or crust it is rotated; the central shaft can be attached to a working rod or shaft, or to a cable.

3,337.—A PAVEMENT FOR ROADS: *W. Purdy and Hindley & Co.*—The blocks, made, by preference, of cement mixed with fine dust granite, are fashioned after the appearance of one cube laid upon another in such a manner as to form ledges or steps, and in other suitable shapes; when they are laid each row has at its end a block and a skew-backed block whose sides are inclined and fit one another; diamond-shaped or rectangular groovings are made along the blocks' wearing surfaces.

3,342.—A CONTRIVANCE FOR OVERFLOW AND SIMILAR PIPES: *F. Smith.*—The inventor's object is to protect from damage the outer end of a lavatory or sink waste-pipe, or of an overflow or some similar pipe, and also to exclude wind and foul gases; he fixes at the pipe's end a metal barrel or ferrule furnished with a hinged lid which under normal conditions will remain closed.

3,358.—SHOES FOR JOISTS; *M. McCallum.*—Notches are cut in the ends of the joists which will fit over ribs of metal, earthenware, or other shoes which are built into the walls; the shoes, which are dovetail-shaped, are made open at the top for window spaces, and for places where the wall is not carried up to above the joists.

3,363-4.—TRAPS AND GULLEY TRAPS: *B. Rogers.*—In the case of the former the inventor provides for the outlet an opening together with a float valve, which, under normal conditions, forms a seal, inasmuch as it rests with its face upon the seating; but when the trap becomes obstructed the rising water lifts up the float, and thereupon discharges itself through the opening and then through the outlet. For gulley traps he fits the gulley at the side of the kerb in conjunction with a box; the box has one inlet grating on its top face, and another inlet grating on its side face; it is also furnished with an outlet at its base which will carry off storm waters.

3,426.—A JOINTING FOR PIPES: *F. W. Brown.*—A jointing is devised in the form of a spigot-and-socket joint for metal or earthenware pipes laid down for sewerage or kindred purposes. A layer of some bituminous substance which will adhere to the surface is applied to the spigot and to the socket pipes; the joint is sealed by means of a wash of suitable lute upon the surfaces before the jointing is effected, and of a stemming of some plastic or fibrous material, or both of them, suitably adapted in section; if, however, the pipes have been moulded with recesses, the layers of bitumen will not be needed: in other instances the layers can be applied to only a part of the joint's length, the rest of the length being filled with liquid cement made fast with packing; the line of the joint may be parallel to the surfaces of the pipes, and a belt may be placed beyond the plastic or fibrous stemming.

MEETINGS.

FRIDAY, JUNE 15.

Carpenters' Company.—Practical Examination at the Company's Schools, Great Titchfield-street. 9.30 a.m. to 5 p.m.

SATURDAY, JUNE 16.

Carpenters' Company.—Vivâ voce Examination at Carpenters' Hall. 12 noon.

British Institute of Certified Carpenters.—Visit to Westminster Abbey at 3.30 p.m. Meet in Cloister, when Mr. T. Wright, clerk of works, will conduct the party over the roof.

People's Palace Architectural Society.—Visit to St. Alban's Cathedral; 2.13 p.m. train from St. Pancras.

MONDAY, JUNE 18.

Royal Institute of British Architects (General Architectural Congress).—8 p.m.—Reception by the President (Mr. Wm. Emerson) in the meeting room of the Institute, 9, Conduit-street, W. 8.30 p.m. (first meeting)—Presentation of the Royal gold medal. (Owing to the unavoidable absence of the recipient, the Commendatore Rodolfo Lanciani, Professor of Roman Topography in the University of Rome, the medal will be received on his behalf by one of the secretaries of the Italian Embassy.) A lantern exhibition to follow of photographs taken in Greece.

Victoria Institute (8, *Adelphi-terrace*).—Rev. R. A. Bullen, F.G.S., on "Eolithic Flint Implements." 4.30 p.m.

TUESDAY, JUNE 19.

Royal Institute of British Architects (Architectural Congress, continued).—3 p.m.—Paper: "The Official Control of Public Buildings," by the President R.I.B.A., Mr. William Emerson. 8.30 p.m.—Conversazione at the Guildhall.

WEDNESDAY, JUNE 20.

Royal Institute of British Architects (Architectural Congress, continued).—11 a.m.—Papers: "The Collaboration of the Architect, the Painter, and the Sculptor," by Mr. E. W. Mountford, Sir Wm. Richmond, K.C.B., R.A., and Mr. Roscoe Mullins. 3 p.m.—Visit to the new Westminster Cathedral, Ashley-place, Victoria-street, S.W. 8 p.m.—Papers: "The Ideal City—Streets and Bridges; Public Monuments; Public Gardens and Open Spaces," by Mr. Halsey Ricardo, the Right Hon. the Earl of Meath, and Mr. T. Stirling Lee.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting of the members. 8 p.m.

THURSDAY, JUNE 21.

Royal Institute of British Architects (Architectural Congress, continued).—12 noon.—Visit to University College Hospital Extension, Gower-street, W.C. 3 p.m.—Visits to Stafford House and other large houses. 8 p.m.—Paper: "The Education of the Public in Architecture," by Mr. Reginald Blomfield.

Society for the Encouragement of the Fine Arts.—Third Conversazione, at the Galleries of the Royal Institute of Painters in Water Colours, Piccadilly. 8.30 p.m.

FRIDAY, JUNE 22.

Royal Institute of British Architects (Architectural Congress, continued).—11 a.m.—Paper: "Uniform Building By-laws," by Mr. Lacy W. Ridge. Mr. Charles Hadfield (Sheffield) and Mr. A. E. Sawday (Leicester) to move the following resolutions:—1. "That in the interests of architecture it is inexpedient that buildings of a municipal character be designed and erected by engineers or surveyors having no architectural training. 2. That as a matter of sound finance and in the interests of ratepayers, it is desirable that the duties of the Borough Engineer and Surveyor should not include work of an architectural character. 3. That it is detrimental to the interests of the architectural profession that buildings of a municipal character should be designed and erected by the Borough Engineer and Surveyor." 3 p.m.—Visits to Messrs. Jas. Powell & Sons' Glass Works, Whitefriars, E.C.; and Messrs. Holloway Bros.' Works, Westminster. 7.30 p.m.—R.I.B.A. Annual Dinner, Whitehall Rooms, Hotel Métropole.

SATURDAY, JUNE 23.

Royal Institute of British Architects (Architectural Congress, concluded).—Visit to Greenwich.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

May 26.—By H. DUKE & SON (at Dorchester).

Allington, &c., Dorset.—Bilshay Farm, 82 a. 1 r., part freehold and part long leasehold £2,550
Upwey, Dorset.—Upwey Manor House and 8 a. 3 r. 1 p., f. 2,500

May 30.—By THOMAS MARSON (at Nuneaton).

Bulkington, Warwick.—The Marston Hall Farm, 110 a. 2 r. 34 p., f. 3,900
The Woodlands Closes, 23 a. 0 r. 39 p., f. 625

May 31.—By JOHN HABGOOD & SON (at Witney).

Curbridge, Oxon.—The Downs Farm, 186 a. 2 r. 7 p., f. and c. 3,300
Hailey, Oxon.—Two enclosures, 15 a. 2 r. 25 p., c. 660

June 1.—By G. B. HILLIARD & SON (at Chelmsford).

Great Baddow, &c., Essex.—Hill Farm, 111 a. 2 r. 23 p., f. 1,180
Danbury, Essex.—Millington House and 1 a., f. ... 520
A builder's yard and premises, f. 125
Stock, Essex.—A copyhold house, r. 10*l.* 210

By A. J. SHEFFIELD.

Mile End.—2, 4, and 6, Nelson-st., u.t. 2½ and 6¾ yrs., g.r. 9*l.* 11s. 175
64, 64a, and 66, Nelson-st., u.t. 19½ yrs., g.r. 20*l.* 400
75 to 81 (odd), Nelson-st.; and 9 and 10, Gray-st., u.t. 18 yrs., g.r. 80*l.* 440
72 to 88 (even), Nelson-st., u.t. 14 yrs., g.r. 118*l.* 1,020
73, Nelson-st.; and 9a, Gray-st., u.t. 18 yrs., g.r. 30*l.* 270
1, 3, and 18, Walden-st., u.t. 6½ yrs., g.r. 6*l.* 10s. 205
15, 17, and 19, Varden-st., u.t. 6½ yrs., g.r. 9*l.* 10s. £240
Commercial-rd., East.—57, Bedford-st., u.t. 18 yrs., g.r. 20*l.*, r. 52*l.* 185
Nos. 257, 261, and 367, u.t. 14 and 4 yrs., g.r. 150*l.* 233
14A, 14 to 20 (even), Philpot-st., u.t. 12 yrs., g.r. 130*l.* 600
Limehouse.—98 to 108 (even), Coutt's-rd., u.t. 49 yrs., g.r. 22*l.* 7*s.* 1,515
Poplar.—9, 11, and 19, Willis-st., u.t. 45 yrs., g.r. 9*l.* 570
46 and 48, Bath-st., u.t. 52 yrs., g.r. 8*l.* 525
Plaistow.—28 to 36 (even), Denmark-st., u.t. 67 yrs., g.r. 10*l.* 15s. 630
13 to 19, Denmark-st., f. 800
Stepney.—22, 24, and 26, York-rd.; and 1, Railway-pl., f. 1,060
3, 5, 7, and 9, Railway-pl., f. 1,100
Poplar.—119 and 121, Kerbey-st., f. 500

June 2.—By BENTLEY, HOBBS, & MYTTON (at Worcester).

Wichenford, Warwick.—Colkett's Farm, 90 a. 3 r. 20 p., f. 1,310

June 6.—By F. J. BISLEY & SON.

Bermondsey.—280 and 282, Rolls-rd., u.t. 39 yrs., g.r. 12*l.* 390
Deptford.—2, Alpha Villas, u.t. 29 yrs., g.r. 5*l.* 15s. 9*d.*, r. 35*l.* 370

By PHIBBS GIBSON & CO.

Dulwich.—28, Park-rd., u.t. 59 yrs., g.r. 10*l.*, r. 50*l.* 470
Brixton.—30, Arlingford-rd., u.t. 74 yrs., g.r. 6*l.* 10s. 280

By E. H. HENRY.

Camberwell.—67 to 73 (odd), Picton-st., also "The Crown" b.-h., area 12,230 ft., f. ..... ,000
Wandsworth.—Nightingale Park Crescent, Glenferns, u.t. 81 yrs., g.r. 9*l.* 9*s.*, r. 50*l.* 650
Clapham.—72 and 74, Clapham Park-rd., u.t. 10 yrs., g.r. 10*l.* 10s., r. 56*l.* 220

By F. JOLLY & CO.

Clapton.—132, Lower Clapton-rd., u.t. 88 yrs., g.r. 8*l.* 10s. 405
Wimbledon.—19 and 20, Park-rd., u.t. 77 yrs., g.r. 14*l.*, r. 72*l.* 660

By LINNETT & LANE.

Haverstock Hill.—7, Crogsland-rd., u.t. 66 yrs., g.r. 8*l.*, r. 48*l.* 480
Harlesden.—156, Manor Park-rd., f., r. 50*l.* 950

By Messrs. MELLERSH.

Mile End.—22 and 23, King-st., f. 640
Witley, Surrey.—Wormley Hill, an enclosure of land, 9 a. 1 r. 30 p., f. 2,500

By R. TIDEY & SON.

Finchley.—15 and 17, Leicester-rd., f., r. 64*l.* ... 1,935
Leytonstone.—Poppleton-rd., Ashton, f., e.r. 38*l.* 490

By A. M. CAWTHORNE.

Whitechapel.—23, St, Mark's-st., u.t. 31 yrs., g.r. 4*l.* 5*s.*, r. 42*l.* 405
28 and 30, Christian-st., u.t. 51½ yrs., g.r. 30*l.* .. 875

By THORNBORROW (at Threlkeld).

Threlkeld, Cumberland.—Enclosures of land, 14 a. 2 r., f. 360
Homestead and enclosures, 24 a. 3 r. 12 p., f. .. 1,200
House, two cottages, and five plots of ground, f. 505

June 7.—By H. BOND, SON, & CO.

Kilburn.—102, Kilburn Park-rd., u.t. 65 yrs., g.r. 8*l.* 400

By WALTER COBB.

East Ham.—1, 3, 5, and 7, Kelly-rd., u.t. 78 yrs., g.r. 14*l.* 14*s.* 800

By DENNANT & CO.

New Eltham, Kent.—The Parade, f.g.r.'s 51*l.* 9*s.*, reversion in 86 yrs. 1,260

By FAREBROTHER, ELLIS, & CO.

Mitcham, Surrey.—1 and 2, Baron-grove; also Baron House, area 8 a., f., r. 26*l.* 8,100
Morden-rd., a triangular plot of land, f. 130

By GLASIER & SONS.

Charing Cross.—Nos. 32 and 33, area 2,728 ft., u.t. 60 yrs., g.r. 240*l.*, r. 1,200*l.* 16,500

By MORLEY & LETTS.

South Kensington.—74, Redcliffe-grdns., u.t. 52 yrs., g.r. 25*l.*, e.r. 135*l.* 930

By NEWBON, EDWARDS, & SHEPHARD.

Islington.—31, Duncan-ter., f., e.r. 100*l.* 1,385
230, Liverpool-rd., u.t. 16 yrs., g.r. 8*l.*, e.r. 50*l.* 235
Holloway.—64, Brecknock-rd., u.t. 45½ yrs., g.r. 8*l.* 10*s.*, e.r. 55*l.* 500
Kentish Town.—60 and 84, Mansfield-rd., u.t. 77 yrs., g.r. 16*l.*, r. 102*l.* 1,445
25, Mansfield-rd., u.t. 48 yrs., g.r. 6*l.* 10*s.*, r. 42*l.* 490
11, Chetwynd-rd., u.t. 73 yrs., g.r. 6*l.* 13*s.* 4*d.*, r. 40*l.* 535
Canonbury.—32, Douglas-rd., u.t. 46 yrs., g.r. 10*l.*, e.r. 70*l.* 500
Hornsey.—7 and 9, Lightfoot-rd., f., r. 73*l.* 9*s.* .. 820
Canning Town.—2 and 14 (even), Union-st., f. 1,470
10 and 11, Tidal Basin-rd., f. 550

By STIMSON & SONS.

Marylebone.—34, Great Titchfield-st., u.t. 47 yrs., g.r. 24*l.*, e.r. 120*l.* 1,425
Brixton.—340, Brixton-rd., f., e.r. 120*l.* 1,700
Canning Town.—Leyes-rd., f.g.r. 14*l.*, reversion in 94 yrs. 330
Westbourne Pk.—Kensal-rd., "The Portobello Arms" p.-h., i.g.r. 100*l.*, u.t. 68 yrs., g.r. 60*l.*, with reversion 660
Hampstead.—45, Loudoun-rd., u.t. 57½ yrs., g.r. 10*l.*, r. 70*l.* 735
Holloway.—44, St. John's Villas, u.t. 74 yrs., g.r. 5*l.* 5*s.*, r. 38*l.* 450
Camberwell.—164, Camberwell-grove, f., e.r. 70*l.* 780
Dulwich.—95, 97, and 103, Underhill-rd., f., r. 144*l.* 2,250
Peckham.—Maxted-rd., &c., f.g.r. 18*l.*, reversion in 47¼ yrs. 1,200
Reedham-st., f.g.r. 6*l.* 8*s.*, reversion in 44¼ yrs. 235
New Cross.—277, Queen's-rd., f., e.r. 60*l.* 900

By WOOTTON & GREEN.

Wandsworth.—3, Broomwood-rd., u.t. 79 yrs., g.r. 7*l.*, e.r. 42*l.* 435
Deptford.—79, Watergate-st., f., r. 26*l.* 300

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Asylum at Whitchurch	Cardiff Corporation	100 Guineas	Aug. 25

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., Supplied by	Tenders to be delivered
*Kerbing, Paving, &c.	Lewisham Board of Works	Surveyor's Department, Town Hall, Catford, S.E.	June 19
*Conversion of Sewage Tanks	Brentford U.D.C.	Nowell Parr, Engineer, Clifden House, Boston-road, Brentford	do.
Eight Houses, Maidstone-street, Bradford		J. H. Dixon, Architect, 90, Heap-lane, Bradford	do.
Main Pipe Sewers, Crofton	Wakefield R.D.C.	F. Massie, Civil Engineer, Kirkgate, Wakefield	do.
Filter Beds, Pipes, Valves, &c., Avon	Rugby U.D.C.	D. G. Macdonald, Civil Engineer, Waterworks Engineer, Rugby	do.
Two Residences, Dewsbury Moor, Yorks.		J. Barton & Co., Architects, Halifax-road, Dewsbury	do.
Waterworks	Clifden (Ireland) R.D.C.	J. Perry, Civil Engineer, County Surveyor's Office, Galway	do.
Sanitary Convenience, near the Old Bridge	Bath U.S.A.	City Surveyor, Guildhall, Bath	do.
Alterations to Offices	Leeds Guardians	Butler, Wilson & Co., Architects, 12, East-parade, Leeds	do.
Hospital Pavilion, Morton Banks, near Keighley	Joint Hospital Board	Judson & Moore, Architects, York Chambers, Keighley	do.
Stable, &c., Swallow-lane	Golcar U.D.C.	A. Shaw, Architect, Golcar	June 20
Stores, &c.	Helmshore (Lancs.) Indus. Soc. Ld.	J. B. Thornley, Architect, Market-street, Darwen	do.
Buildings, Hall, &c., Barnstaple	Mr. A. H. Miller	J. Crocker, Architect, 98, Queen-street, Exeter	do.
Additions to Ladywell Mills, Hall-lane, Bradford		A. Sharpe, Architect, Market-street, Bradford	do.
Additions to Abattoir, Cycle-street	Cardiff Corporation	W. Harpur, Civil Engineer, Town Hall	do.
Vicarage House, Llandewi, Glam.	Rev. J. Hughes	J. W. Rodger, Surveyor, 14, High-street, Cardiff	do.
Additions to School, Bare	Morecambe School Board	J. Hartley, Architect, Queen-street, Morecambe	June 21
Additions to Workhouse	Nantwich Guardians	C. E. Davenport, Architect, Nantwich	do.
Additions to Schools, Abernant	Aberdare School Board	T. Roderick, Architect, Clifton-street, Aberdare	do.
Halls and Police Station, Paisley-road	Glasgow Corporation	J. Lindsay, 64, Cochrane-street, Glasgow	do.
Pumping Station, &c.	Much Wenlock (Salop) D.C.	W. Wyatt, Engineer, All Saints, Shrewsbury	do.
Alterations to Business Premises, Bristol	Messrs. Rowe Brothers & Co., Ltd.	H. J. Jones, Architect, 12, Bridge-street, Bristol	do.
Offices, &c., Kinross, N.B.	Royal Bank of Scotland	D. Smart, Architect, Perth	June 22
Reservoir, Sweeney Mountain	Oswestry R.D.C.	Shayler & Madoc-Jones, Engineers, Oswestry	June 23
Cast-iron Pipes, (60 tons)	Bedwellty (Mon.) U.D.C.	J. H. Lewis, Civil Engineer, Blackwood, Mon.	do.
Rebuilding Church, Llangennech, Llanelly	Rev. E. Davies	E. M. B. Vaughan, Architect, Cardiff	do.
Laying Mains, Castle-street, &c.	Glasgow Corporation	J. M. Gale, Engineer, 45, John-street, Glasgow	do.
House, Ashleigh-road, Horsham		W. Buck, Architect, North-street, Horsham	do.
Public Conveniences, Liscard	Wallasey U.D.C.	W. H. Travers, Engineer, Public Offices, Egremont	do.
Cattle House and Barn, Constantine, Cornwall		W. Richards, Trenowles, St. Hilary, Cornwall	June 24
*Fencing and Gates	London County Council	Park's Department, 11, Regent-street, S.W.	June 25
Steel Girder Bridge	Great Northern Ry. Co. (Ireland)	T. Morrison, Secretary, Amiens-street Terminus, Dublin	do.
Store Premises, Birkby	Huddersfield Indus. Society, Ltd.	J. Berry, Architect, 9, Queen-street, Huddersfield	do.
Steel and C.I. Bridge, Lower Darwen	Blackburn Corporation	W. Stubbs, Civil Engineer, Municipal Offices	do.
Sewerage Works, Exning	Newmarket U.D.C.	Beesley & Co, Engineers, 11, Victoria-street, S.W.	do.
Bridge, Irnham	Bourne (Lincs.) R.D.C.	C. W. Bell, Council Offices, Bourne	do.
Library Buildings, Armley	Leeds Corporation	P. Robinson, Architect, 72, Albion-street, Leeds	do.
*Schools	Northfleet School Board	S. J. Adams, Weston Chambers, Weston-road, Southend-on-Sea	do.
*Paving	Barnet U.D.C.	W. H. Mansbridge, Surveyor, 40, High-street, Barnet	June 26
*Precipitating Tanks, &c.	do.	do.	do.
*Installation of Pneumatic Tubes at Paddington Station	Great Western Railway	Electrical Engineer, Paddington Station, W.	do.
Sewering, Levelling, Paving, &c.	Hornsey U.D.C.	Engineer, Council Offices, Southwood-lane, Highgate, N.	do.
Sewerage Works	Barking Town U.D.C.	C. F. Dawson, Surveyor, Public Offices, Barking	do.
Bridge Building, Hildrop-road, Nelson	L. and Y. Railway Company	R. C. Irwin, Hunts Bank, Manchester	do.
Copper Tubing, Calorifiers, &c.	Salford Corporation	L. C. Evans, Town Hall	do.
*Sewerage Works	Litherland U.D.C.	Mr. W. B. Garston, Surveyor, 25, Sefton-road, Litherland	June 27
*School	Frome U.D.C.	See Advertisement	June 28
*Bascule Bridge	Hull Corporation	City Engineer, Town Hall, Hull	June 29
Stabling and Four Houses, Bowling	Bradford Provident Indus. Soc.	Rycroft & Firth, Architects, Manchester-road, Bradford	do.
*Taking-down and Rebuilding Bridge, Witham	Essex County Council	Chief Surveyor, County Offices, Chelmsford	June 30
*Hospital at Bolton-road	Hull Corporation	Pole & Little, Architects, 9, Gray's Inn-square, W.C.	July 2
*Alterations and Additions to the Venta, Baldwin-st.	Bristol Corporation	See Advertisement	July 3
*Redecoration of Town Hall, &c.	Gravesend Town Council	E. J. Bennett, Architect, 189, Parrock-street, Gravesend	July 4
*Filters, Tanks, &c., for Sewage Disposal	Taunton Corporation	Borough Surveyor, Taunton	July 5
*Additions to Newington Workhouse	St. Saviour's Union	G. D. Stevenson, Architect, 13, King-street, E.C.	do.
*Superstructure of New Asylum		See Advertisement	July 16
Farm Buildings, Bodmin, Cornwall	Asylum Visitors	S. Trevail, Architect, Truro	July 21
Road Works, Burley and Menston, Yorks.		H. & E. Marten, 5, Charles-street, Bradford	No date
Granite Kerbing, Channelling, and Cubes	Middlesex County Council	H. T. Wakelam, County Engineer, Guildhall, Westminster, S.W.	do.
New Road, off Mapperley-road, Nottingham		H. J. Price, Architect, 24, Low Pavement, Nottingham	do.
Filter Tanks, &c., Eagle Mill, Delph		R. W. Oddy, Toad-lane, Rochdale	do.
Seven Houses, Perry-street, Wednesbury		F. Senior, Dixon's-road Tannery, Chesterfield	do.
Well Sinking, Pitsmoor, Sheffield		E. Winder, Architect, Wharf-street, Sheffield	do.
Stabling, House, &c., Harrogate	Mr. Thos. Hargreaves	Butler, Wilson & Co., Architects, 12, East Parade, Leeds	do.
Laundry at Asylum, Melrose, N.B.		Mitchell & Wilson, Architects, 13, Young-street, Edinburgh	do.
Church and School, Cardigan Mount, Leeds		P. Robinson, Architect, 72, Albion-street, Leeds	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Storekeeper and Timekeeper	Richmond (Surrey) Town Council	40s. (&c.), weekly	June 18
*Clerk of Works	Latham and Burscough U.D.C.	3*l.* per week	June 25
*Engineering Assistant	Beckenham U.D.C.	100*l.* per annum	June 28
*Clerk of Works	Leicester Corporation	50s. weekly	June 30
*County Surveyor	West Suffolk County Council	120*l.* per annum	July 11

Those marked with an asterisk (*) are advertised in this Number. ***Competitions***, p. iv. ***Contracts***, pp. iv. vi. viii. x. & xvii. ***Public Appointments***, pp. xva. xvb. & xvii.

June 8.—By H. J. CHEFFINS.

Landwade, &c., Cambs.—Landwade Hall Estate, 484 a. 0 r. 11 p., f. £16,000

Exning, Suffolk.—The Manors of Cotton's Hall and Coggeshall 600

By CHARLES HALL.

Balham.—5, Laitwood-rd., u.t. 79 yrs., g.r. 10*l.*, r. 48*l.* 400

Clapham.—27, Orlando-rd., u.t. 70 yrs., g.r. 12*l.*, e.r. 60*l.* 475

By W. B. HALLETT.

Enfield.—1, 2, and 3, Central-bldgs., f., r. 140*l.* .. 1,950

By VINCENT S. LEIGH.

Hackney.—181, 183, and 185, Morning-lane, f. .. £800

15 to 27 (odd), 31, and 33, Bridge-st., f. 2,055

23, 25, and 27, St. Thomas-rd., u.t. 31½ yrs., g.r. 26*l.* 900

65, Tudor-rd., u.t. 31 yrs., g.r. 2*l.*, e.r. 45*l.* 480

175, Richmond-rd., u.t. 45 yrs., g.r. 6*l.*, e.r. 48*l.* 425

15, The Grove, c., r. 36*l.* 385

Homerton.—62 and 64, Ballance-rd., u.t. 59 yrs., g.r. 6*l.* 6s. 430

By ROBERT REID.

St. Pancras.—Drummond-st., i.g r.'s 132*l.*, u.t. 19¼ yrs., g.r. 26*l.* 1,005

Hampstead-rd.—Robert Mews, i.g.r. 26*l.*, u.t. 21¼ yrs., g.r. 5*l.* 10s. £175

Mornington-cres., i.g.r. 23*l.* 10s., u.t. 18¼ yrs., g.r. 5*l.* 170

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent yd. for yard.

PRICES CURRENT OF MATERIALS

WOOD.*

	£ s. d.	£ s. d.
Per Petersburg standard hundred.		
White Sea: first yellow deals	17 15 0	22 10 0
Second do.	15 15 0	18 0 0
Third do.	12 15 0	14 10 0
Battens, 40s., 30s., and 15s. less respectively.		
Petersburg: first yellow deals	15 0 0	17 15 0
Second do.	12 10 0	13 15 0
Battens, 30s. and 20s. less respectively.		
Petersburg, white deals	12 0 0	14 15 0
Do. white battens	10 15 0	12 0 0
Riga, white deals	9 15 0	11 10 0
Swedish mixed yellow deals	16 5 0	21 0 0
Third do.	14 10 0	16 15 0
,, Fourth do.	13 0 0	14 5 0
,, Fifth do.	12 0 0	13 5 0
Battens, 30s., 20s., and 10s. less respectively.		
Whitewood, 10 to 20 per cent. less.		
Finnish unsorted yellow deals	11 10 0	12 5 0
Battens, 10s. and 5s. less respectively.		
Whitewood, 5 to 10 per cent. less.		
Norwegian second yellow battens	8 10 0	9 0 0
Third do.	8 0 0	8 15 0
Fourth do.	7 15 0	8 5 0
Whitewood, 10s. less.		
Danzig, Crown Deck deals, per 40 ft. 3 in.	0 15 0	1 5 0
Brack	0 12 0	1 0 0
St. Lawrence Pine deals, &c., per P.S.H.:—		
1st, Bright and Dry, regular sizes	21 15 0	28 15 0
,, ,, oddments	15 5 0	22 15 0
2nd ,, regular sizes	17 5 0	19 15 0
,, ,, oddments	11 15 0	16 5 0
3rd, ,, regular sizes	11 0 0	12 0 0
,, ,, oddments	9 10 0	10 10 0
4th ,, regular sizes	10 0 0	11 0 0
,, ,, oddments	9 0 0	10 0 0
St. Lawrence Spruce deals, &c.		
First, regular sizes	12 15 0	15 0 0
Second ,,	10 10 0	11 0 0
Third ,,	10 5 0	10 10 0
Fourth ,,	9 15 0	10 5 0
Oddments and battens at 20s., 10s., 7s. 6d., and 5s. less respectively.		
New Brunswick Spruce deals, &c.	10 0 0	11 15 0
Oddments, battens, and fourths	9 10 0	10 0 0
United States pitch pine planks and boards	11 0 0	15 0 0
Prepared Boards, per square		
1¼ by 6½ and 7 in. 1st yellow	11 6	16 6
,, ,, 2nd ,,	11 0	13 6
1 by 6½ and 7 in. 1st ,,	10 6	12 6
,, ,, ,, white	9 6	10 6
,, ,, 2nd yellow	9 6	11 6
,, ,, ,, white	8 6	9 6
¾ by 6½ & 7 in. 1st & 2nd yellow	8 6	9 6
,, ,, ,, white	8 0	9 0
¾ by 6½ and 7 in. 1st yellow and white (grooved, tongued, and beaded)	9 0	10 0
¾ by 6½ and 7 in. 2nd yellow and white (ditto)	8 0	9 0
¾ by 6½ and 7 in. 1st yellow and white (ditto)	7 0	8 0
¾ by 6½ and 7 in. 2nd yellow and white (ditto)	6 6	7 6
Narrower widths at 10 per cent. less. 3rd quality at 15 per cent. less than 2nd.		
Danzig and Memel Fir Timber—per load		
Best middling	3 10 0	3 15 0
Good middling and Second	3 0 0	3 5 0
Common middling	2 15 0	3 0 0
Undersized	2 15 0	3 0 0
Swedish and Norwegian Balks	2 5 0	2 10 0
Baltic Oak Timber—		
Danzig and Stettin—Large	4 5 0	6 0 0
Small	3 12 6	4 10 0
Quebec Timber per load		
Yellow Pine	5 5 0	6 15 0
Oak	4 0 0	6 0 0
Elm	4 0 0	4 5 0
Ash	3 5 0	4 0 0
Birch	3 12 6	6 0 0
New Brunswick, &c., Birch	3 7 6	4 5 0
American Pitch Pine Timber	2 17 6	4 5 0
Wainscot, per log, 18 cubic ft.—		
Crown (Eng. & Dutch) nominal	3 0 0	4 0 0
Brack nominal	2 7 6	3 0 0
Lathwood, per cubic fathom—		
Petersburg	4 0 0	6 10 0
Riga and Danzig	4 10 0	5 10 0
Norway Poles, per ft. run	0 0 1	0 0 1½
Oak Staves, per mille full size pipe		
Memel, Crown	220 0 0	230 0 0
Brack	190 0 0	200 0 0
Danzig	165 0 0	175 0 0
Bosnia, single Barrel (nominal)	28 0 0	30 0 0
United States, Pipe	37 10 0	45 0 0
Hogshead, extra heavy and double extra	32 0 0	35 0 0
Indian Teake per load	10 10 0	16 0 0
British Guiana Greenheart	0 0 0	8 0 0
Mahogany, per foot superficial—		
Honduras, cargo average	0 0 4½	0 0 5½
Nicaragua, do.	0 0 4½	0 0 5½
Tabasco, do.	0 0 4½	0 0 6
Mexican, do.	0 0 4	0 0 4½
Panama, do.	0 0 3½	0 0 4
African, do.	0 0 3½	0 0 5
Cuba, do.	0 0 6	0 0 8
St. Domingo, do.	0 0 5	0 0 7½
Do. Curls (good to prime)	0 0 9	0 1 3
Walnut, American (logs)	0 3 0	0 5 0
Do. do. (planks and boards)	0 2 0	0 7 6
Italian, per foot superficial	0 0 3	0 0 7½
Black Sea, per ton	6 0 0	12 0 0
Satin Walnut (logs) per foot cube	0 1 0	0 1 6
,, (planks and boards)	0 1 9	0 3 0

* The prices named are for the wood as imported and landed in the docks. Ten per cent., approximately, should be added in order to arrive at the current trade prices.

PRICES CURRENT (*Continued*).

	£ s. d.	£ s. d.
Sequoia (Californian redwood), per foot cube	0 1 9	0 2 0
White wood, American (logs)	0 1 4	0 1 9
,, ,, (planks and boards)	0 1 9	0 2 9
Quartered oak ,, ,, ,,	0 2 3	0 4 0
Kauri pine (logs)	0 1 9	0 2 0
,, ,, (planks)	0 2 3	0 2 9
Jarrah (planks)	0 2 0	0 2 3
Lancewood spars each, fresh and large	0 5 0	0 7 0
Lancewood spars, ordinary to fair	0 3 0	0 4 0
Degame spars	0 8 0	0 10 0

METALS.

IRON—Pig, in Scotland ton	3 7 6	0 0 0
Bar, Welsh, in London	9 0 0	9 15 0
Do. do. at works in Wales	8 10 0	9 0 0
Do. Staffordshire, in London	9 15 0	11 15 0
COPPER British cake and ingot	75 0 0	76 0 0
Best selected	76 0 0	77 0 0
Sheets, strong	84 0 0	0 0 0
Chili bars	71 7 6	71 12 6
YELLOW METAL lb.	6½d.	7d.
LEAD—Pig		
Spanish ton	17 5 0	0 0 0
English Com. Brands	17 12 6	0 0 0
Sheet, English, 6 lbs. per sq. ft. and upwards	19 2 6	0 0 0
Pipe	19 12 6	0 0 0
ZINC—		
Vieille Montagne ton	28 10 0	0 0 0
Silesian	28 0 0	0 0 0
Spelter	20 10 0	20 12 6
TIN—Straits	143 0 0	0 0 0
Australian	145 0 0	0 0 0
English Ingots	147 0 0	0 0 0
Banca	0 0 0	0 0 0
Billiton	0 0 0	0 0 0

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1 oz. thirds	2½d. per ft. delivered.
,, fourths	2d. ,, ,,
21 oz. thirds	3d. ,, ,,
,, ,, fourths	2¾d. ,, ,,
26 oz thirds	4d. ,, ,,
,, ,, fourths	3½d. ,, ,,
32 oz. thirds	5d. ,, ,,
,, ,, fourths	4½d. ,, ,,
Fluted sheet, 15 oz.	2¾d. ,, ,,
,, ,, 21 ,,	3½d. ,, ,,

OILS, &c.

	£ s. d.	£ s. d.
Raw Linseed Oil in pipes, per ton	36 0 0	0 0 0
,, ,, ,, in drums, per gal.	0 3 0	0 0 0
Boiled ,, ,, in pipes, per ton	38 0 0	0 0 0
,, ,, ,, in drums, per gal.	0 3 2	0 0 0
TAR—Stockholm barrel	1 6 6	0 0 0
Archangel	1 0 0	0 0 0
Turpentine, in barrels, per cwt.	2 6 0	0 0 0
,, in drums, per gal.	0 3 8	0 0 0
Genuine Ground English White Lead	26 0 0	0 0 0
Red Lead	22 0 0	0 0 0
Best Linseed Oil Putty, per cwt.	0 8 0	0 0 0

VARNISHES, &c.

	per gallon.
Fine Elastic Copal Varnish for outside work	0 16 0
Best Elastic Copal Varnish for outside work	1 0 0
Best Elastic Carriage Varnish for outside work	0 16 0
Best Hard Oak Varnish for inside work	0 10 0
Best Extra Hard Church Oak Varnish for inside work	0 10 0
Fine Hard Copal Varnish for inside work	0 16 0
Best Hard Copal Varnish for inside work	1 0 0
Best Hard Carriage Varnish for inside work	0 16 0
Extra Pale Paper Varnish	0 12 0
Best Japan Gold Size	0 10 0
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 8 0
Brunswick Black	0 8 0
Berlin Black	0 15 6
Knotting	0 9 0
Best French and Brush Polish	0 8 6

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Hard Stocks	32 0	per thousand alongside, in river.
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Shippers	42 0	,, ,, ,, ,,
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Best Fareham Red	72 6	,, ,, ,, ,,
Best Blue Pressed Staffordshire	86 0	,, ,, ,, ,,
Best Stourbridge Fire Bricks	84 0	,, ,, ,, ,,
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Headers	240 0	,, ,, ,, ,,
Quoins and Bull-nose	340 0	,, ,, ,, ,,
Double Headers	320 0	,, ,, ,, ,,
Best Dipped Salt Glazed Stretchers and Headers	240 0	,, ,, ,, ,,
Quoins and Bull-nose	280 0	,, ,, ,, ,,
Double Headers	280	0 per thousand at railway depôt.
Seconds Quality White and Dipped Salt Glazed	40	0 per thousand less than best.
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Thames Ballast	6 9	,, ,,
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Beer ,,	1 6½	,, ,,
Grinshill ,,	1 10	,, ,,
Brown Portland in blocks	2 2	,, ,,
Darley Dale ,,	2 1½	,, ,,
Red Corsehill ,,	2 5	,, ,,
Red Mansfield ,,	2 4½	,, ,,
Hard York ,,	2 10	,, ,,
Hard York 6 in. sawn both sides landings, to sizes (under 40 ft. sup.)	2 7	per ft. super at rly. depôt.
,, ,, 6 in. Rubbed Ditto	2 10½	,, ,,
,, ,, 3 in. sawn both sides slabs (random sizes)	1 3	,, ,,
,, ,, 3 in. self-faced Ditto	0 9	,, ,,

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in. in.	£ s. d.	
20×10 best blue Bangor	11 5 0	per 1000 of 1200 at ry. depôt
,, best seconds ,,	10 15 0	,, ,,
16× 8 best ,,	6 2 6	,, ,,
20×10 best blue Portmadoc	10 18 0	,, ,,
16× 8 ,, ,,	6 0 0	,, ,,
20×10 best Eureka unfading green	11 2 6	,, ,,
16× 8 ,, ,,	6 15 0	,, ,,
20×10 Permanent green and Sedan green	10 0 0	,, ,,
16× 8 ,, ,,	5 12 6	,, ,,

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* Denotes *accepted.* † Denotes *provisionally accepted.*

BECKINGHAM (Gainsborough).—For the erection of Board schools and master's house, for the School Board. Messrs. Eyre & Southall, architects, Retford. Quantities by the architects:—

Bee & Son	£3,097 0	J. Furniss	£2,919 0
Rowsell	2,986 0	T. Hopkinson	2,910 0
G. Hopkinson	2,982 0	C. Greenwood, Gainsborough‡	2,631 12
Brown & Son	2,974 0		
J. Woods	2,964 0		

‡ Reduced and provisionally accepted.

BLYTH RETFORD.—For the erection of Wesleyan chapel and schools, for the Trustees. Messrs. Eyre & Southall, architects, Retford. Quantities by the architects:—

T. Hopkinson	£2,420	T. H. Marrison, Scrooby*	£1,186
G. Hurst	2,420		

BURTON-ON-TRENT.—For additions to school, Stapenhill, for the (U.D.) School Board. Mr. R. Churchill, architect, St. Paul's-square, Burton-on-Trent:—

For Playground and Cottage.

Geo. Kennard, Stapenhill, Burton-on-Trent* £2,230 0 0

For Iron Fencing.

Gough & Felgate, Burton-on-Trent* 179 5 6

CHURCH VILLAGE (Pontypridd).—For the erection of a house at Church Village for Mr. T. Griffiths. Messrs. Griffiths & Jones, architects, Tonypandy:—

Evan Jones, Mill-street, Pontypridd* ..... £520.

[*See also next page.*

CORK.—For additions, &c., to Dripsey House, for Mrs. Bowen Colthurst. Messrs. W. H. Hill & Son, architects, 28, South Mall, Cork :—
Patrick Murphy, John-street, Cork*.....£371.
Five contractors competed. Highest tender £480.

CRAIGROTHIE (N.B.).—For additions, &c., to farmhouse, Ring, for the University Court of St. Andrew's. Mr. David Henry, architect, St. Andrew's :—

Masonry.—J. Stark, Cupar Muir	£79	10	0
Joinery.—T. Donaldson, Kame, Cupar	114	11	0
Plumbing.—A. Stewart, Cupar	20	16	8
Slating.—T. Black, St. Andrew's	30	2	0
Plastering. — Robb & McIntosh, Cupar	33	5	5
Total.....	£278	5	1

CROYDON.—For alterations and decorations at The Mount, Duppas-hill, Croydon, for Mr. W. F. Knight. Mr. H. Fuller Clark, architect, 28, John-street, Bedford-row, W.C. :—

Hayward & Son	£1,395	J. & C. Bowyer	£1,249
Smith & Sons	1,255	Simpson & Son*	1,100

EAST DER HAM.—For the supply and delivery of granite road me l for the Urban District Council. Mr. H. G. Himson, rveyor, East Dereham :—

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Ellis & Everard, Burdon, Leicester, 13s. 9d. per ton.*

Quenast Stone.

Sommerfeld & Co., Hull and King's Lynn, 12s. 7d. per ton*.

LONDON.—For alterations and repairs to "The Wave" lodging-house, Victoria Dock-road, E., for Mansfield House University Settlement. Mr. H. C. Lander, architect, Effingham House, Arundel-street, W.C. Quantities by Mr. C. A. Jaques, 29, Darthmouth Park-avenue, N.W. :—

Tregar & Son	£598	Smith & Sons	£530
Symes	546	W. J. Maddison, Canning Town*.....	515
H. M. Dove.....	545		

LONDON.—For erecting a three-story factory and other alterations at Crosby-row, Bermondsey. Mr. Edward Crosse, architect :—

G. Parker	£2,050 0 0	J. Chalkley ..	£1,659 0 0
J. Young	1,697 0 0	Newton	1,644 13 11
H. J. Williams	1,693 0 0	Wells & Son*	1,615 0 0
F. & H. Higgs	1,670 0 0		

LONDON.—For alterations to "The Princess Alexandra" p.-h., Barking-road, London, E. Mr. Herbert Riches, architect, 3, Crooked-lane, King William-street, E.C. Quantities supplied :—

Courtney & Fairbairn	£1,205	Osborn & Sons*	£1,067
Sheffield Bros.	1,156	T. Welsh‡.....	925
W. J. Maddison	1,142		

‡ Withdrawn—error.

LONDON.—For structural alterations to premises, Hertford-road, Lower Edmonton, N. Mr. Herbert Riches, architect, 3, Crooked-lane, King William-street, E.C.

A. Porter.....	£425 0	P. Hart*.....	£357 9
Knight & Son	405 0		

LONDON.—For repairs and decorations at "The Crystal Tavern," Mile End, E. Messrs. Foulsham & Herbert Riches, architects, 3, Crooked-lane, King William-street, E.C., and Bromley-by-Bow, E. :—

A. Webb	£399	T. H. Jackson	£335
S. Salt	339	Osborn & Sons*.....	323

LONDON.—For internal repairs to houses, &c., at the Licensed Victuallers' Asylum, Asylum-road, Old Kent-road, S.E. Mr. W. F. Potter, architect :—

R. J. Young	£260	W. Croft, Sydenham*	£170
F. Dawes	224		

LONDON.—For erection of stabling for Messrs. Tilling & Co. at Lee, S.E. Mr. A. L. Guy, architect :—

Derman	£6,622 14	Staines.....	£5,590 0
Daly.....	5,880 0	Faulkner	5,583 0
Havell	5,793 0	Jerrard	5,561 0
Courtney	5,697 0	Kennard Bros.*..	5,533 0
Leng.....	5,622 0		

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Wm. Ball, East-street, Okehampton £1,397 10 0

OXTED.—For a residence at Oxted, on the Stonehall Farm Estate, for Mr. W. W. Wise. Mr. Theodore Gregg, architect, 1a, St. Helen's-place, E.C. :—

Barrett & Power....	£3,200	W. Shepherd*	£2,902
G. P. & H. Barnes..	2,941		

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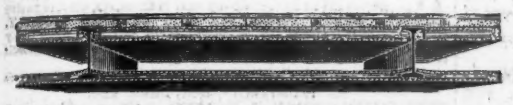

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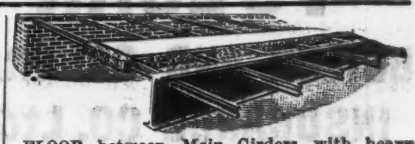

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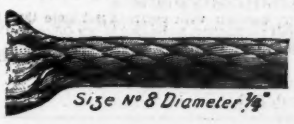

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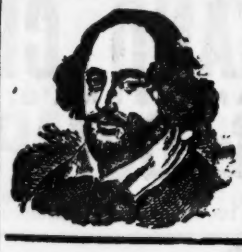

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FOR DISPOSAL, Builder's MATERIAL DEPOT (centre West-end) doing a good steady trade. First-class opportunity for jobbing connexion. Established over 20 years. Stabling. Fullest particulars given.—Apply, Mr. CHALLEN, Estate Agent, 41, Haymarket, S.W.

OLD-ESTABLISHED JOBBING BUILDER'S in East End FOR SALE, or Partnership entertained. Turnover exceed 1,000*l*. Would be largely increased in hands of energetic man, who is a good manager of men. Convenient premises at low rental. No agents.—Box 209, Office of "The Builder."

STEAM JOINERY WORKS FOR DISPOSAL. Splendid opening for builders' materials. Large, rapidly-increasing seaport town. Employing 40 men; scope for 200. First-class premises, standing on two acres of ground, with nice villa residence, two cottages. Established 13 years. Price, including valuable freehold, all machinery, plant, and stock, 8,500*l*. Possession with 2,000*l*. to right party. Well kept books open to strict investigation. An absolutely genuine concern, where one or two good business men can quickly amass a competency.—Plans and photos, &c. at ELLIS CLARKE & CO.'S, 11, Southampton-row, W.C.

BUILDER and DECORATOR'S, fast increasing suburb, West London. A nice detached house, in main road. 12 rooms. Workshops, yard, and side entrance. Moderate rent, on lease; or will sell ground lease Returns 2,000*l*. at excellent profits. Books proved. Price only 350*l*. including the valuable plant. Established 17 years.—Call on ELLIS CLARKE & CO. Builders' Agents, 11, Southampton-row, Holborn.

BUILDER & DECORATOR'S, Belgravia district, S.W. Shop and residence of 11 rooms, at a nominal rent, on lease. First-class connexion of over 40 years' standing in same family. Returns have been 5,000*l*. but owing to a death are somewhat neglected. Price asked, 500*l*. and valuation. No reasonable offer will be refused. Open to strict investigation. — Call, ELLIS CLARKE & CO. above.

BUILDER (Jobbing) & DECORATOR'S, S.E. Private residence, workshops, yard, stables, &c. Rent, 52*l*. inclusive. Returns show net profit of 300*l*. yearly, book proof. Price only 275*l*. including good plant, horse, cart, trap, &c. Same hands 30 years. Sound reasons for giving up. Genuine bargain. Also another Builder and Decorator's in Belgravia district. Returns recently 5 000*l*. Now neglected through death. Price 500*l*. Also another Builder and Decorator's, St. John's Wood. Good little jobbing business. Price 130*l*.—ELLIS CLARKE & CO. Builders' Agents, 11, Southampton-row, Holborn.

Refer also to "TOO LATE" *column page* xvii.

ARCHITECTURAL CONGRESS, LONDON.
From the 19th to 23rd JUNE.
Persons desiring to attend Meetings are invited to apply for tickets to the SECRETARY, R.I.B.A. 9, Conduit-street, W.

INSTITUTE OF
SANITARY ENGINEERS
(INCORPORATED)
THE NEXT
EXAMINATION
IN
Practical Sanitary Science
WILL BE HELD IN LONDON,
SEPTEMBER 21st and 22nd, 1900.
Gentlemen already established in practice in any of the various branches of the sanitary profession are admitted to membership under certain conditions without examination.
Further Particulars of the Secretary.
OFFICES: 63 & 64, CHANCERY LANE, LONDON, W.C.

SANITARY INSPECTORS' and PRACTICAL SANITARY SCIENCE EXAMS. of THE SANITARY INSTITUTE. Complete Courses of Instruction by correspondence for these and similar exams. conducted by Gentleman (Engineer, Surveyor, and Sanitary Inspector), holding three Certificates from San. Inst. 1st Class Honours Medallist in Hygiene, &c. Several hundred successes. Classes for 1900 EXAMS. just commencing.—Apply for Syllabus of Subjects, testimonials, &c. to C. S. I. 28, Victoria-street, Westminster, S.W.

SURVEYORS' INSTITUTION EXAMINATIONS.—Complete courses of preparation in class or by correspondence in all divisions and sub-divisions. At the last six examinations the following prizes were obtained by Mr. PARRY'S pupils:—1895 and 1896: Institution Prize, Driver Prize, and Penfold Silver Medal; 1897: Institution Prize and Special Prize; 1898: Institution Prize, Special Prize, Driver Prize, Penfold Silver Medal, and Crawter Prize (one of the two bracketted winners of the last); 1899: Institution Prize, Special Prize, Driver Prize, Penfold Silver Medal, and Penfold Gold Medal (all the prizes but one); 1900: Driver Prize, Penfold Silver Medal, and Penfold Gold Medal. CONSIDERABLY MORE THAN HALF of the successful list were Mr. Parry's pupils.—Apply to Mr. RICHARD PARRY, F.S.I. A.M.I.C.E. No. 82, Victoria-st. Westminster. Telephone No. 680, Westminster.

SANITARY INSTITUTE EXAMS. — Preparation for the Inspectors' Examination by a system of correspondence needing no Text Books or Acts, by C. H. CLARKE, Assoc.San.Inst.; Fellow Inst. of San. Engineers; Honours Medallist in Hygiene; Member of the Society of Arts and of Société Française d'Hygiène. See Clarke's Aids:—Calculation of Cubic Space, 1s.; Practical Drain Inspection, 6d.; Trade Nuisances, 6d. Sanitary Law (New Edition), 1s. 6d.—Prospectus from 120, Thoroid-road, Ilford, E.

MUNICIPAL and COUNTY ENGINEERS' EXAMINATION.—Mr. RICHARD PARRY, A.M.I.C.E. F.S.I. &c. 82, Victoria-street, Westminster, prepares pupils by correspondence for this examination. The course of work may be taken to extend over six or twelve months, according to previous knowledge. At the examination of last October, more than one-half of the successful candidates were prepared by Mr. Parry.

R.I.B.A. EXAMS. — PREPARATION personally or by correspondence, in three, six, nine, or twelve months' courses. ARCHITECTURAL LENDING LIBRARY. Special three months' finishing courses.—For full particulars apply to Messrs. HOWGATE & BOND, Associates R.I.B.A. 115, Gower-street, W.C. (close to the British Museum).

TO ARCHITECTS, BUILDERS, ETC.
TYPEWRITING DONE. Own office and machine. Five years builder and contractors' office. Specifications, quantities, 2d. per folio (72 words); variation accounts, 3d. Versed all technical terms. Work by post receives immediate attention.—Box 195, Office of "The Builder."

GOOD LIGHT OFFICE on Third Floor TO BE LET, close to Law Courts. Suitable for draughtsman.—Apply, M. 17, Essex-street, Strand.

PARTNERSHIP. — A Young Architect of artistic abilities, with good and varied practical experience, both London and provincial, and who has carried out considerable work on his own account, desires PARTNERSHIP in well-established and good general practice. Is an able designer and expert draughtsman. Communications treated in confidence.—Box 204, Office of "The Builder."

PARTNER WANTED, with small capital, in well-established VENTILATING MANUFACTURING BUSINESS. One with good experience in ventilating business preferred.—Address, with full particulars, Box 205, Office of "The Builder."

NORTHERN POLYTECHNIC INSTITUTE, HOLLOWAY, LONDON, N.
INSTRUCTOR IN PLUMBING REQUIRED for the session beginning September, 1900.—Apply for particulars to the Secretary, at the Institute.

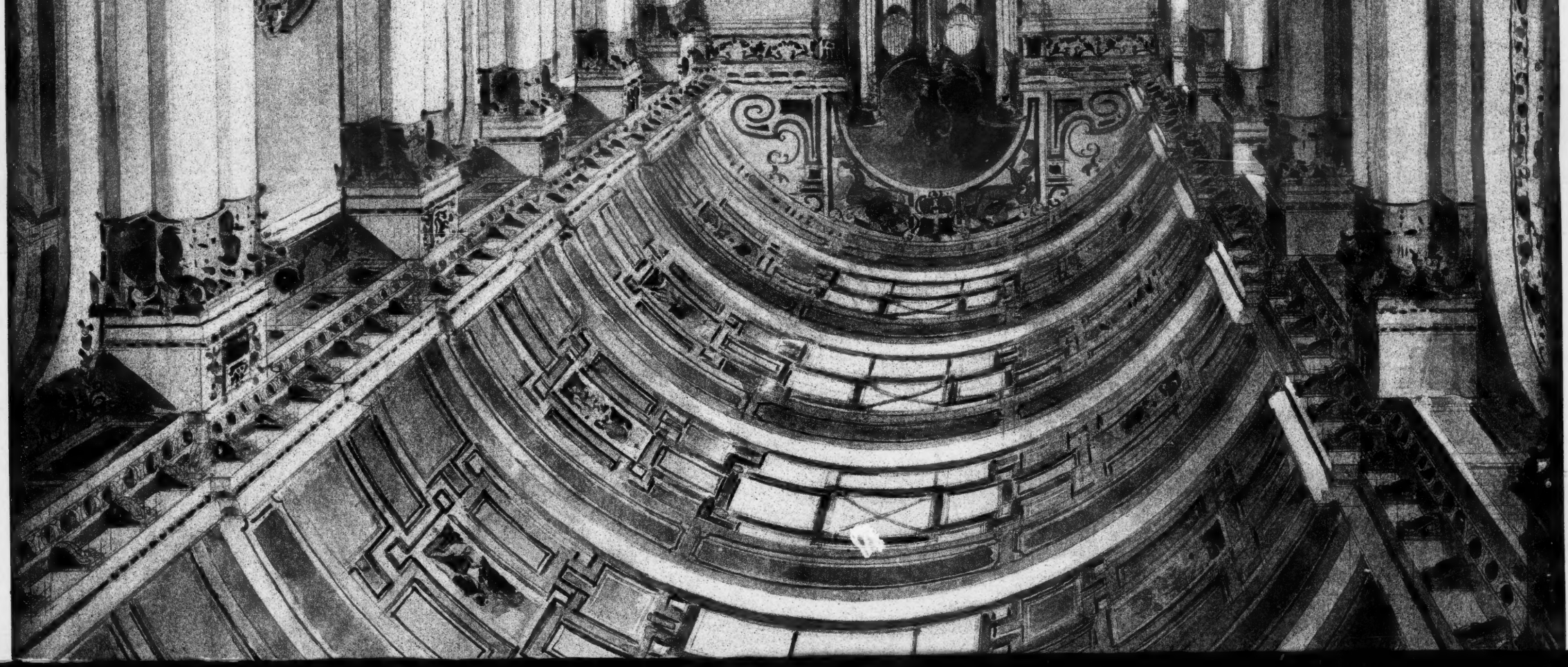
NORTHERN POLYTECHNIC INSTITUTE, HOLLOWAY, LONDON, N.
INSTRUCTOR IN MASONRY REQUIRED for the session beginning September, 1900.—Apply for particulars to the Secretary, at the Institute.

COUNTY COUNCIL of MIDDLESEX.
TOTTENHAM POLYTECHNIC.
The Committee of the Tottenham Polytechnic invite APPLICATIONS from experienced teachers of the following subjects for the session 1900-1901:—
1. Carpentry and Joinery and Manual Training.
2. Wood-Carving.
The classes are held in the evening, commencing not earlier than Seven o'clock.
Full particulars may be obtained from the Secretary.
Applications, marked "Evening Classes," accompanied by not more than three recent testimonials, must be received not later than TWELVE o'clock on WEDNESDAY, JUNE 20th, 1900, by
J. W. TOMLINSON, Secretary.
The Polytechnic, South Tottenham.

LATHOM and BURSCOUGH URBAN DISTRICT COUNCIL.
SEWERAGE WORKS.
CLERK OF WORKS.
The Urban District Council of Lathom and Burscough REQUIRE the SERVICES of a CLERK of WORKS, to superintend the construction of their Sewerage Works, at a salary of 3*l*. per week.
Applicants must have had recent experience in works of this description, and the selected candidate must be prepared to devote his whole time to the duties of the office.
Applications, together with copies of not more than three testimonials and full particulars, to be sent to my Office, 22, Derby-street, Ormskirk, before ONE o'clock on the 25th day of JUNE, 1900.
FRED. C. HILL, Clerk.
Ormskirk,
June 2nd, 1900.

ADMINISTRATIVE COUNTY of WEST SUFFOLK.
APPOINTMENT OF COUNTY SURVEYOR.
The West Suffolk County Council are prepared to receive APPLICATIONS from candidates for the Office of COUNTY SURVEYOR for the Administrative County of West Suffolk.
Salary, 120*l*. per annum, to include travelling expenses, and 4*l*. per cent. commission on any work exceeding 500*l*. and not exceeding 1,500*l*. the County reserving the right to employ any architect or surveyor or make any arrangement they may think fit in regard to works exceeding 1 500*l*.
The person appointed will be required to provide an office at his own expense in Bury St. Edmunds, and to reside at some place in the Administrative County to be approved by the County Council, and will be entitled to enter into private practice. The appointment will be subject to determination by six calendar months' notice on either side.
The duties are to look to the repair and state of all County bridges, the roads over and approaches to same, where repairable by the County, to see that the main roads (approximately 21 miles in extent) are properly maintained, to purchase all materials for same, to look to the repair and state of all County buildings, to prepare plans, specifications, and estimates for buildings, bridges and repairs thereto, and to discharge the usual duties of a surveyor and architect, and to attend the several meetings of the County Council, the Standing Joint Committee, the Highways and Bridges Committee, and any other meetings as directed, and from time to time to report in writing upon all matters appertaining to the office.
Applications, stating age, qualifications, and references, accompanied by copies of recent testimonials, are to be sent so that the same are received by me not later than the 11th JULY, 1900.
The person appointed will be required to enter upon his duties on the 1st OCTOBER next.
A. TOWNSHEND COBBOLD,
Deputy Clerk of the County Council.
County Hall, Ipswich,
June 14th, 1900.

LONDON COUNTY COUNCIL. — ARCHITECTURAL ASSISTANT REQUIRED. Student just completing articles preferred. Forms of application can be obtained between June 15th and 20th, from the Architect to the Council, Fire Brigade Branch, 25, Cockspur-street, S.W



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INTERIOR OF MOOT HALL, COLCHESTER TOWN HALL.—Mr. J. Belcher, A.R.A., Architect.

THE LIBRARY, WESTBROOK HALL.—Mr. C. A. Nicholson, A

THE LIBRARY, WESTBROOK HALL.—Mr. C. A. Nicholso

GENERAL LIBRARY,
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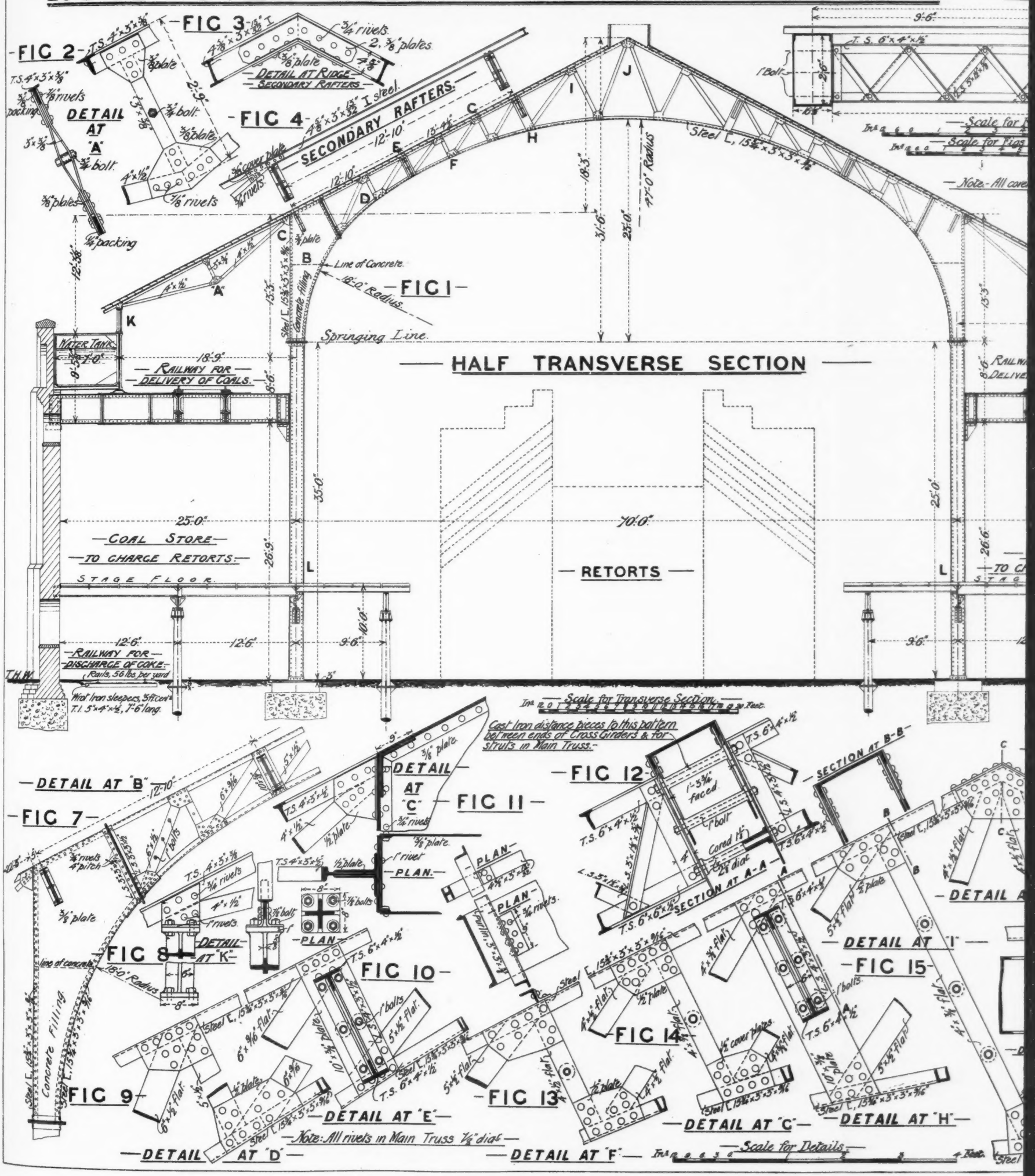
A. NICHOLSON, ARCHITECT

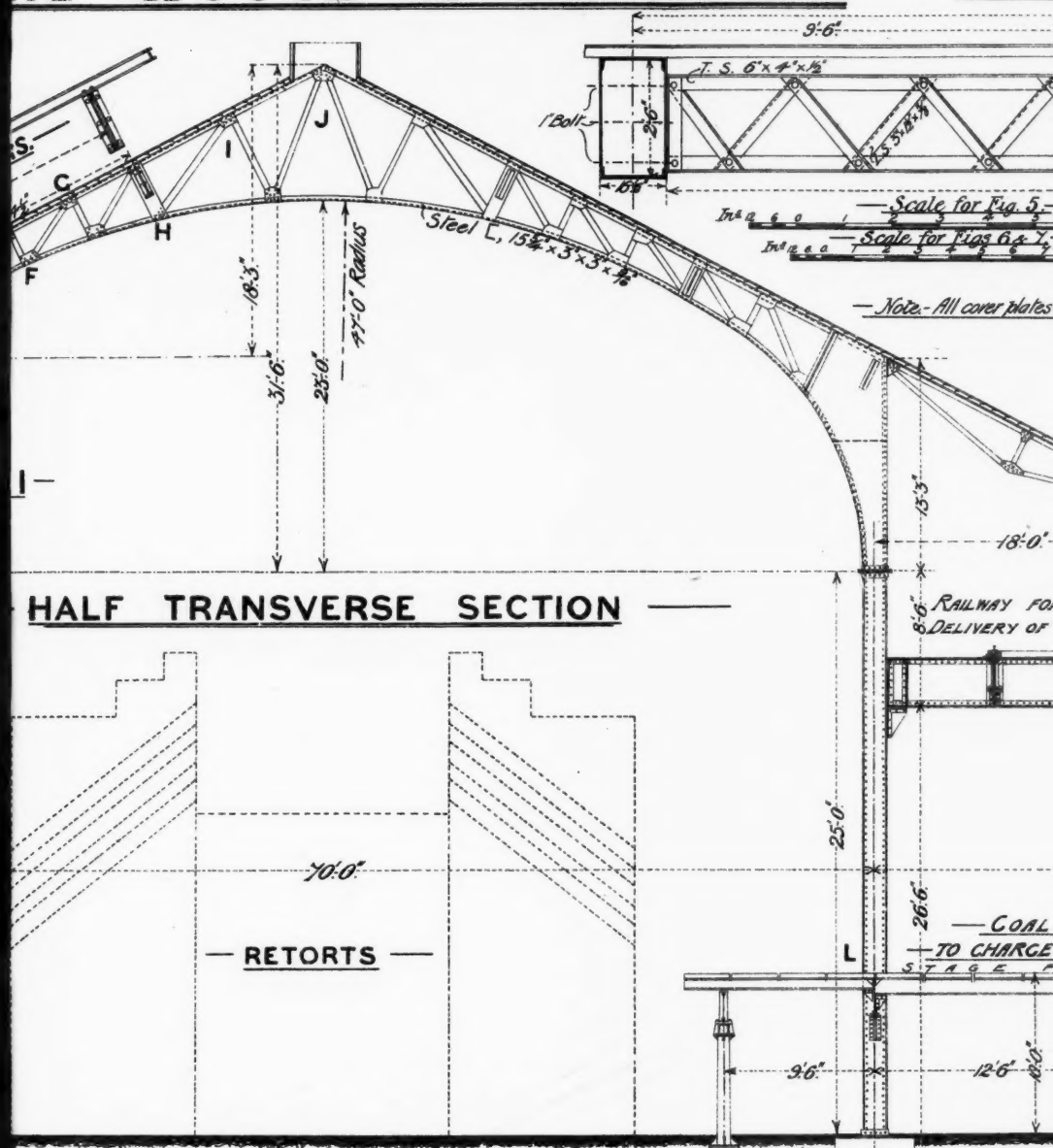
ROOF OVER RETORT HOUSE AT BECKTON.



SECTION AND DETAILS OF ROOF OVER RETORT HOUSE, BECKTON.—Mr. G. C

(In illustration of Paper by Mr. A. T. Walmisley, *M. Inst. C.E.*

RT HOUSE AT BECKTON. —FIG 5



SECTION AND DETAILS OF ROOF OVER RETORT HOUSE, BECKTON.—Mr. G. C. Trew

(In illustration of Paper by Mr. A. T. Walmisley, *M.Inst.C.E.)*

— FIG 5 — ELEVATION OF CROSS GIRDERS.

28'-6"
9'-6" 9'-6"
Secondary Rafter
4½"×3"×½" 1" rivets 3"×3"×⅜" L.S. Purlins.
1" Bolt
1" Bolt
1" Bolt
1" rivets
T.S. 6"×4"×½"
27'-1½"
4'-9" 4'-9" 9'-6" 4'-9"
⅜" plate. T.S. 3"×3"×⅜"
Secondary Rafter.
4'-0"
3'-6"
SEE DETAIL AT H.
⅜"
⅜"
Scale for Fig. 5.
Feet.
for Figs 6 & 7.
Feet.
All cover plates ½" steel.

— SIDE ELEVATION OF VENTILATOR.

⅝" rivets
3"×⅜" Flat iron lateral bracing at ventilator over each Main truss and one between.
⅝" rivet
— HALF PLAN —

— FIG 6 —
Centre Line.
Working Line.
8'-6"
4'-0" Radius
Steel C. 15¾"×3"×3"×⅜"

18'-0"
— ROOF SIMILAR TO ANNEXED SPAN —
RAILWAY FOR DELIVERY OF COAL.
WATER TANK. WATER TANK.
Concrete filling
E E
M

— FIG 19 —

25'-0" 25'-0"
— COAL STORE — TO CHARGE RETORTS. — STAGE FLOOR.
— COAL STORE — TO CHARGE RETORTS. — STAGE FLOOR.
½" plate
L.S. 3½"×3½"×½"
2'-0"
½" plate
¾" Steel Plate.
35'-3"
26'-9"
11"
9'-0"
12'-6" 12'-6" 12'-6" 12'-6"
— RAILWAY FOR DISCHARGE OF COKE —
— RAILWAY FOR DISCHARGE OF COKE Rails 56 lbs. per yard —
T.H.W.
T.I. 5"×4"×½" 7'-6" long.
W.I. Sleepers 5ft. Gauge T.I. 5"×4"×½" 7'-6" long.

— FIG 16 —
½" plate
4"×½" Flats
½" Forged Channel Cover
4"×½" Flats
— SECTION AT C-C —
— SECTION AT E-E —
Concrete Filling.
2'-2"
— FIG 18 —
— PLAN —
1" metal
1½" metal.
12¾" 12¾"
2'-5"
— DETAILS AT 'M' —
— FIG 21 —
— FIG 20 —
L.S. 4"×4"×⅝"
Concrete Filling.
¾" plate.
1¾" bolts
— SECTION AT D-D —
— ELEVATION OF STEEL STANCHEONS L-L —

— FIG 17 —
2'-0"
⅞" rivets
Cover Plates Forged Steel, ½" thick.
— DETAIL OF COVER PLATES —
½" plate
4"×½" Flat
Steel L. 15¾"×3"×3"×⅜"

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R. G. C. TREWBY, M.INST.C.E., ENGINEER.

Inst.C.E.)

R

-F

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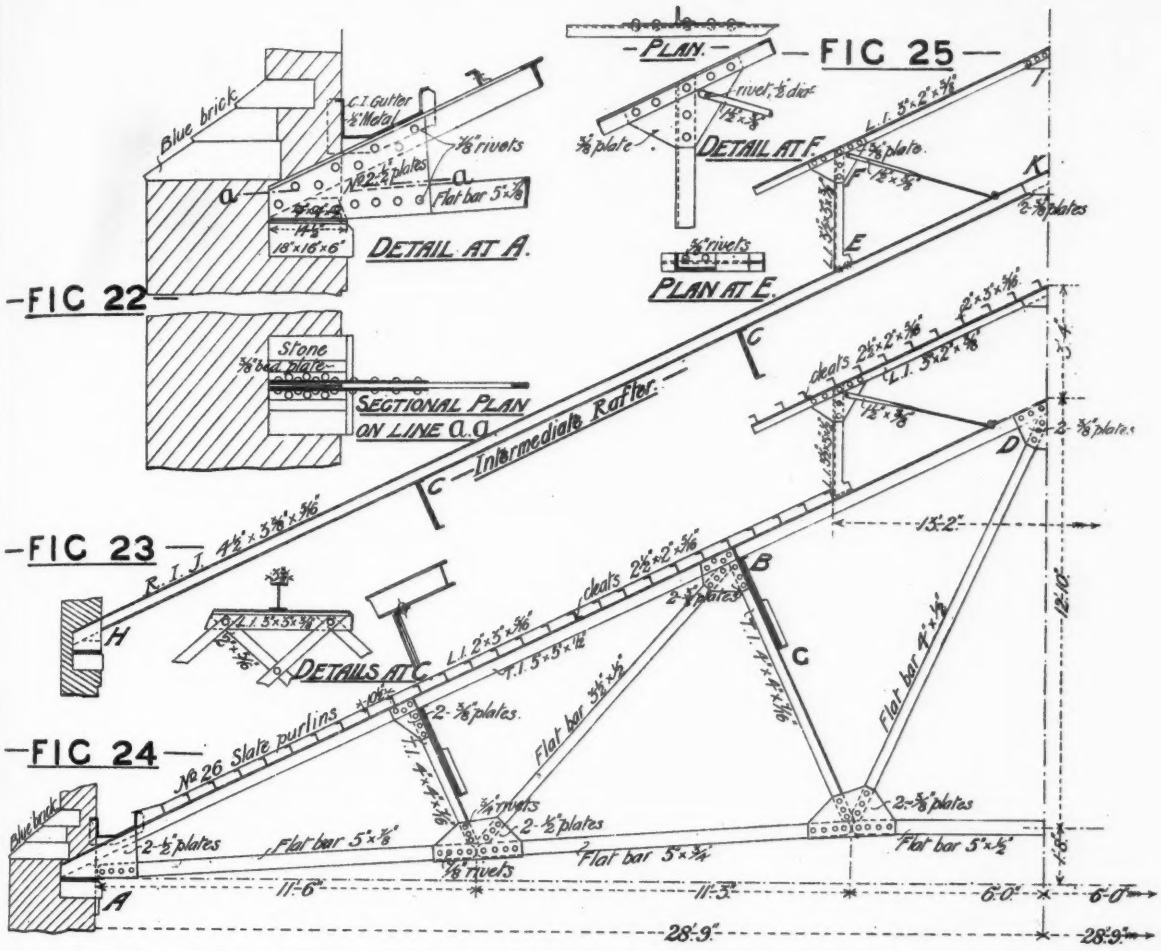
ROOF OVER RETORT HOUSE AT BOW COMMON.



Note:- Where chimney shaft occurs slate purlins are to be trimmed round.

HALF ELEVATION OF MAIN PRINCIPALS.

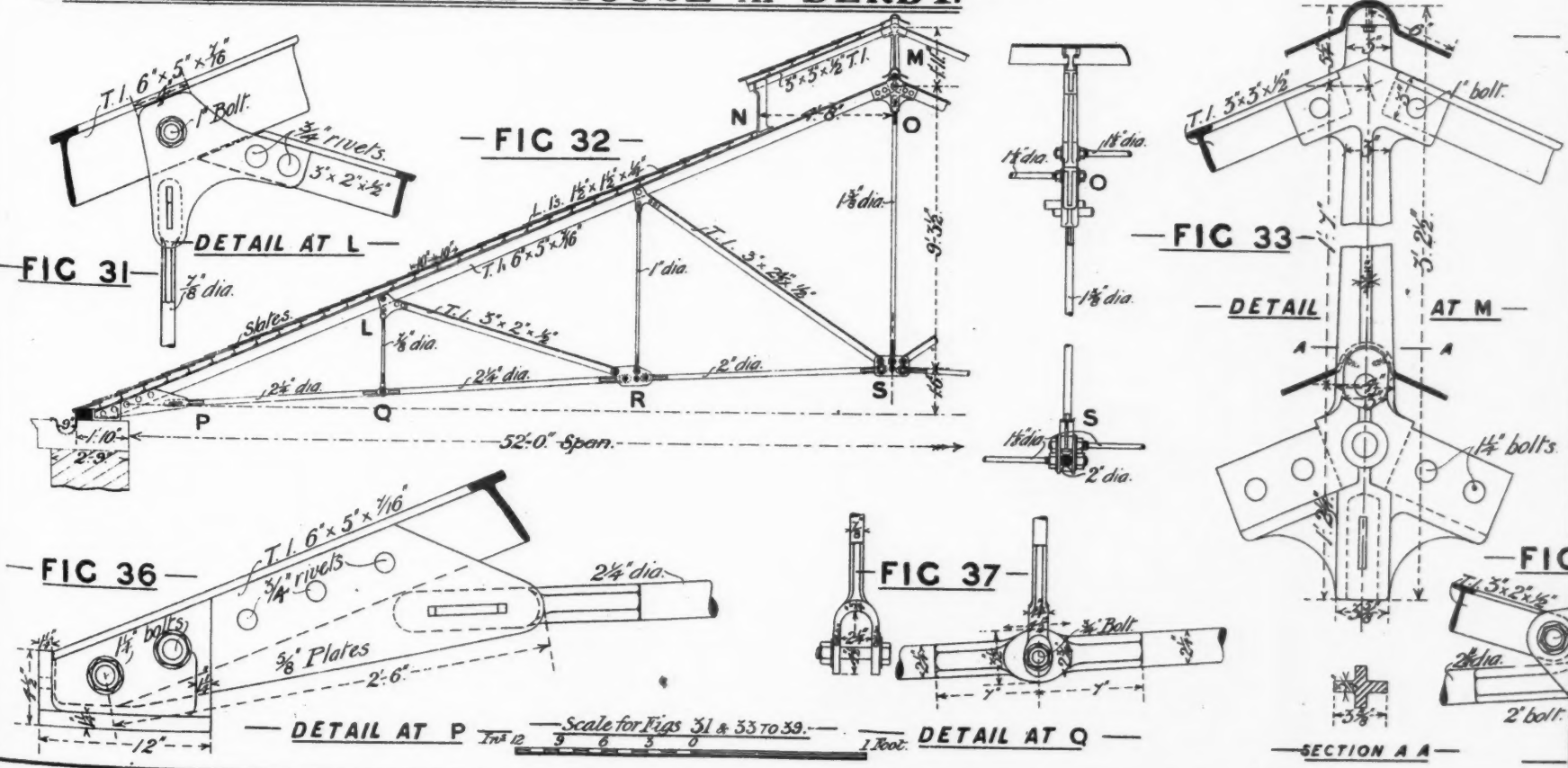
Ins. 12 c. c.

Scale for Figs 23, 24, 30 & 32: 0 1 2 3 4 5 6 7 8 9 10 11 12 15 Feet.

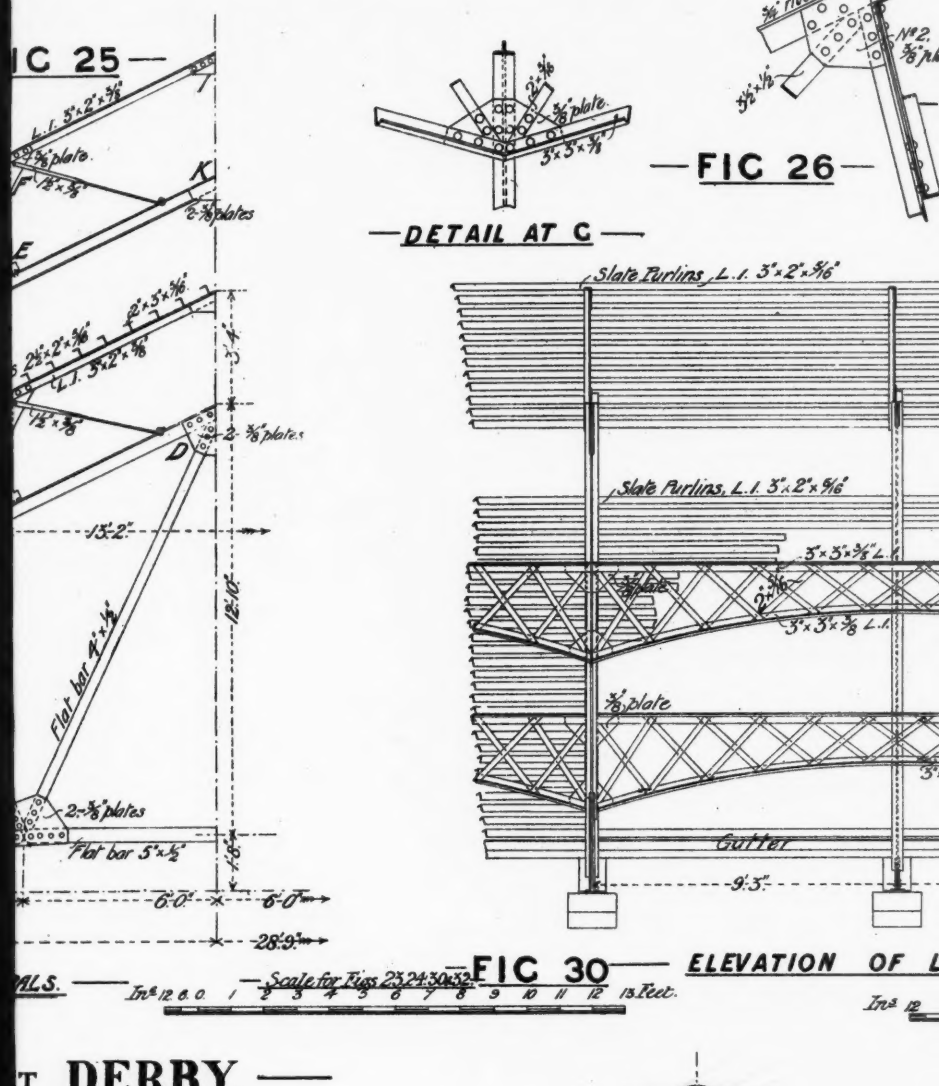
FIG 30 — ELEVATION OF

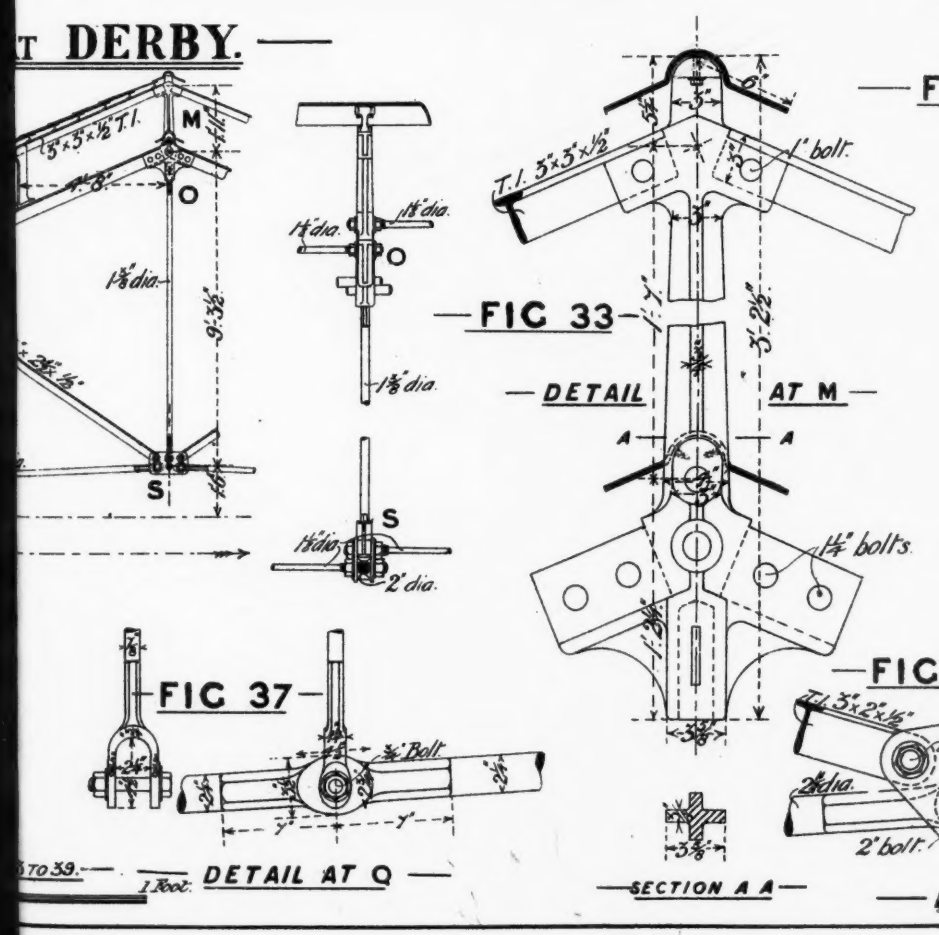
Ins. 12

ROOF OVER RETORT HOUSE AT DERBY.

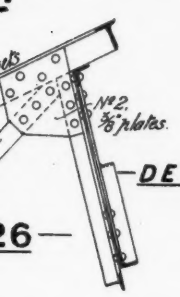


SECTION AND DETAILS OF ROOF OVER RETORT HOUSE, BOW COMMON (MR. G.
AND OF
ROOF OVER RETORT HOUSE, DERBY (MESSRS. T. HAWKSLEY & SON
(In illustration of Paper by MR. A. T. WALMISLEY, *M.Inst.C.E.)*





AND DETAILS OF ROOF OVER RETORT HOUSE, BOW COMMON (Mr. G. C
AND OF
ROOF OVER RETORT HOUSE, DERBY (Messrs. T. Hawksley & Sons
(*In illustration of Paper by* Mr. A. T. Walmisley, *M.Inst.C.E.*)



DETAIL AT B

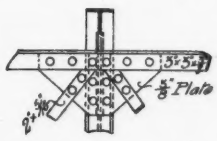
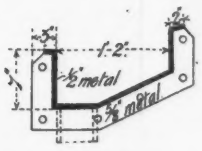
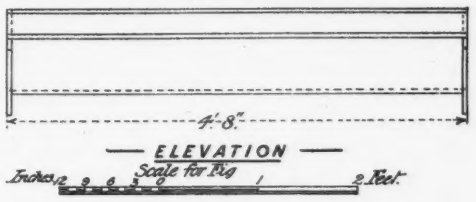


FIG 27

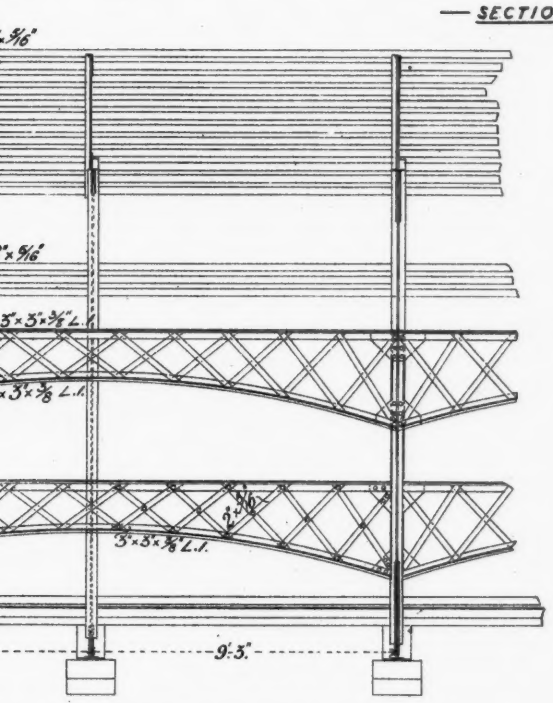
DETAILS OF CUTTER



SECTION



ELEVATION



ON OF LATTICE PURLINS.

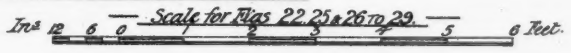
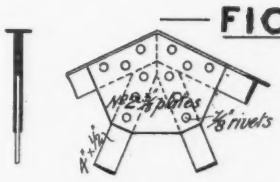


FIG 28

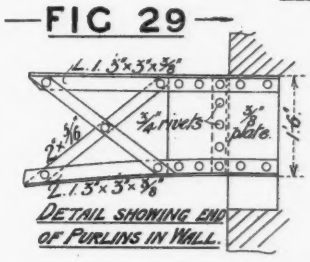


DETAIL AT D

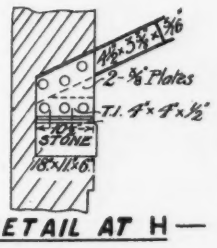
DETAIL AT I

DETAIL AT K

FIG 29



DETAIL SHOWING END OF PURLINS IN WALL.



DETAIL AT H

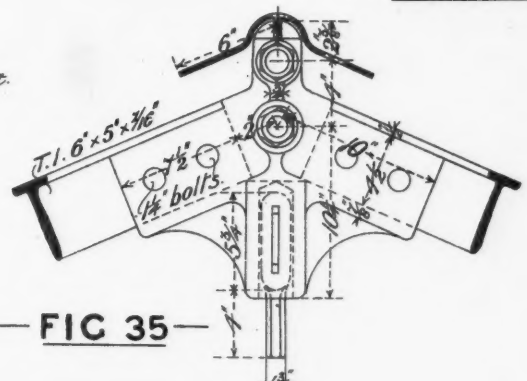


FIG 35

DETAIL AT O

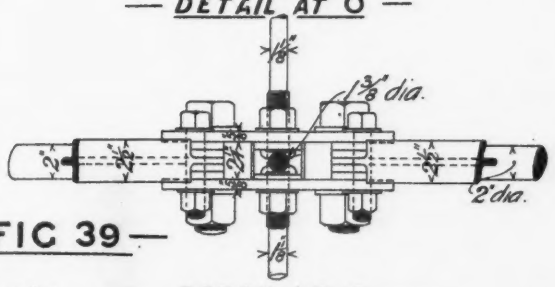


FIG 39

DETAIL AT S

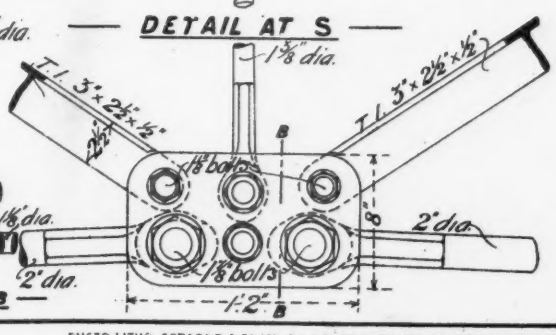
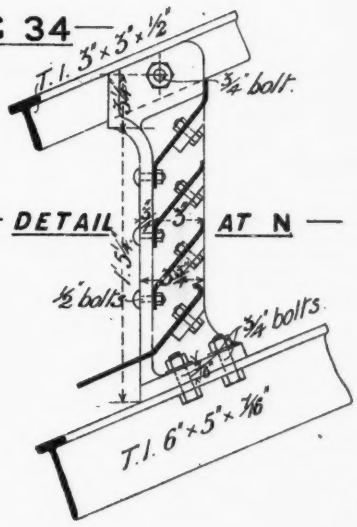


FIG 34

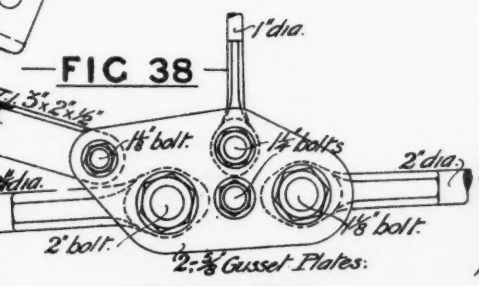


DETAIL AT N

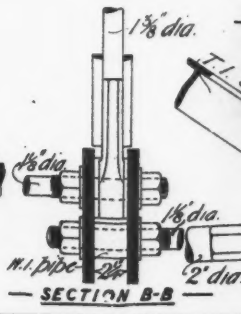
M

1 1/4" bolts.

FIG 38



DETAIL AT R



SECTION B-B

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N (Mr. G. C. Trewby, M.Inst.C.E., Engineer),

LEY & Sons, Engineers).

I. Inst. C.E.)